

# A M A T E U R R A D I O



Vol. 33, No. 11



NOVEMBER  
1965

2/6

IAS	2/0 10/	2042 15/-	886 7/8 3 a £1	887 7/8 3 a £1	707 5/-	5 a £1	57	5/-	3 a £1	EF20	5/-	3 a £1
IAS	5/-	2046 18/-	888 12/6	890 7/8 3 a £1	708 3/0 7 a £1	58	5/-	3 a £1	EF20 (V80)			
IC7	3/-	2051 12/-	893Q5 17/-	895 7/8 3 a £1	709 7/8 3 a £1	117A	7/8	3 a £1		and socket 5/6		
IC8	7/8 3 a £1	2052 12/-	894 5/-	896 7/8 3 a £1	710 7/8 3 a £1	715A	7/8	3 a £1	EF20	5/-	3 a £1	
IF75	10/-	2044 25/-	895 5/-	897 4/-	711 4/-	716	10/-		EF75	5/-	3 a £1	
IK6	7/8 3 a £1	2045 10/-	896 12/6	898 12/6	712 7/8 3 a £1	820B	10/-		EF78	5/-	3 a £1	
IK1	5/-	2047 10/-	897 10/-	899 12/6	713 7/8 3 a £1	806	25/-		EF86	20/-		
IK2	5/-	2048 10/-	898 12/6	900 12/6	714 7/8 3 a £1	12A	5/-	3 a £1	EF87	5/-	3 a £1	
IK3	5/-	2049 10/-	899 12/6	901 12/6	715 7/8 3 a £1	12B	5/-	3 a £1	EF88	5/-	3 a £1	
IK4	5/-	2050 10/-	900 12/6	902 12/6	716 7/8 3 a £1	12C	5/-	3 a £1	EF89	5/-	3 a £1	
IL5	5/-	2051 10/-	901 12/6	903 12/6	717 7/8 3 a £1	12D	5/-	3 a £1	EF90	5/-	3 a £1	
ILN5 (CV11)		2052 10/-	902 12/6	904 12/6	718 7/8 3 a £1	12E	5/-	3 a £1	EF91	5/-	3 a £1	
IM3	5/-	2053 10/-	903 12/6	905 12/6	719 7/8 3 a £1	12F	5/-	3 a £1	EF92	5/-	3 a £1	
IP9	5/-	2054 10/-	904 12/6	906 12/6	720 7/8 3 a £1	12G	5/-	3 a £1	EF93	5/-	3 a £1	
IQ3	5/-	2055 10/-	905 12/6	907 12/6	721 7/8 3 a £1	12H	5/-	3 a £1	EF94	5/-	3 a £1	
IR8	10/-	2056 10/-	906 12/6	908 12/6	722 7/8 3 a £1	12I	5/-	3 a £1	EF95	5/-	3 a £1	
IS2	10/-	2057 10/-	907 12/6	909 12/6	723 7/8 3 a £1	12J	5/-	3 a £1	EF96	5/-	3 a £1	
IS3	10/-	2058 10/-	908 12/6	910 12/6	724 7/8 3 a £1	12K	5/-	3 a £1	EF97	5/-	3 a £1	
IS4	10/-	2059 10/-	909 12/6	911 12/6	725 7/8 3 a £1	12L	5/-	3 a £1	EF98	5/-	3 a £1	
IS5	10/-	2060 10/-	910 12/6	912 12/6	726 7/8 3 a £1	12M	5/-	3 a £1	EF99	5/-	3 a £1	
IS6	10/-	2061 10/-	911 12/6	913 12/6	727 7/8 3 a £1	12N	5/-	3 a £1	EF100	5/-	3 a £1	
IS7	10/-	2062 10/-	912 12/6	914 12/6	728 7/8 3 a £1	12O	5/-	3 a £1	EF101	5/-	3 a £1	
IS8	10/-	2063 10/-	913 12/6	915 12/6	729 7/8 3 a £1	12P	5/-	3 a £1	EF102	5/-	3 a £1	
IS9	10/-	2064 10/-	914 12/6	916 12/6	730 7/8 3 a £1	12Q	5/-	3 a £1	EF103	5/-	3 a £1	
IS10	10/-	2065 10/-	915 12/6	917 12/6	731 7/8 3 a £1	12R	5/-	3 a £1	EF104	5/-	3 a £1	
IS11	10/-	2066 10/-	916 12/6	918 12/6	732 7/8 3 a £1	12S	5/-	3 a £1	EF105	5/-	3 a £1	
IS12	10/-	2067 10/-	917 12/6	919 12/6	733 7/8 3 a £1	12T	5/-	3 a £1	EF106	5/-	3 a £1	
IS13	10/-	2068 10/-	918 12/6	920 12/6	734 7/8 3 a £1	12U	5/-	3 a £1	EF107	5/-	3 a £1	
IS14	10/-	2069 10/-	919 12/6	921 12/6	735 7/8 3 a £1	12V	5/-	3 a £1	EF108	5/-	3 a £1	
IS15	10/-	2070 10/-	920 12/6	922 12/6	736 7/8 3 a £1	12W	5/-	3 a £1	EF109	5/-	3 a £1	
IS16	10/-	2071 10/-	921 12/6	923 12/6	737 7/8 3 a £1	12X	5/-	3 a £1	EF110	5/-	3 a £1	
IS17	10/-	2072 10/-	922 12/6	924 12/6	738 7/8 3 a £1	12Y	5/-	3 a £1	EF111	5/-	3 a £1	
IS18	10/-	2073 10/-	923 12/6	925 12/6	739 7/8 3 a £1	12Z	5/-	3 a £1	EF112	5/-	3 a £1	
IS19	10/-	2074 10/-	924 12/6	926 12/6	740 7/8 3 a £1	12AA	5/-	3 a £1	EF113	5/-	3 a £1	
IS20	10/-	2075 10/-	925 12/6	927 12/6	741 7/8 3 a £1	12AB	5/-	3 a £1	EF114	5/-	3 a £1	
IS21	10/-	2076 10/-	926 12/6	928 12/6	742 7/8 3 a £1	12AC	5/-	3 a £1	EF115	5/-	3 a £1	
IS22	10/-	2077 10/-	927 12/6	929 12/6	743 7/8 3 a £1	12AD	5/-	3 a £1	EF116	5/-	3 a £1	
IS23	10/-	2078 10/-	928 12/6	930 12/6	744 7/8 3 a £1	12AE	5/-	3 a £1	EF117	5/-	3 a £1	
IS24	10/-	2079 10/-	929 12/6	931 12/6	745 7/8 3 a £1	12AF	5/-	3 a £1	EF118	5/-	3 a £1	
IS25	10/-	2080 10/-	930 12/6	932 12/6	746 7/8 3 a £1	12AG	5/-	3 a £1	EF119	5/-	3 a £1	
IS26	10/-	2081 10/-	931 12/6	933 12/6	747 7/8 3 a £1	12AH	5/-	3 a £1	EF120	5/-	3 a £1	
IS27	10/-	2082 10/-	932 12/6	934 12/6	748 7/8 3 a £1	12AI	5/-	3 a £1	EF121	5/-	3 a £1	
IS28	10/-	2083 10/-	933 12/6	935 12/6	749 7/8 3 a £1	12AJ	5/-	3 a £1	EF122	5/-	3 a £1	
IS29	10/-	2084 10/-	934 12/6	936 12/6	750 7/8 3 a £1	12AK	5/-	3 a £1	EF123	5/-	3 a £1	
IS30	10/-	2085 10/-	935 12/6	937 12/6	751 7/8 3 a £1	12AL	5/-	3 a £1	EF124	5/-	3 a £1	
IS31	10/-	2086 10/-	936 12/6	938 12/6	752 7/8 3 a £1	12AM	5/-	3 a £1	EF125	5/-	3 a £1	
IS32	10/-	2087 10/-	937 12/6	939 12/6	753 7/8 3 a £1	12AN	5/-	3 a £1	EF126	5/-	3 a £1	
IS33	10/-	2088 10/-	938 12/6	940 12/6	754 7/8 3 a £1	12AO	5/-	3 a £1	EF127	5/-	3 a £1	
IS34	10/-	2089 10/-	939 12/6	941 12/6	755 7/8 3 a £1	12AP	5/-	3 a £1	EF128	5/-	3 a £1	
IS35	10/-	2090 10/-	940 12/6	942 12/6	756 7/8 3 a £1	12AQ	5/-	3 a £1	EF129	5/-	3 a £1	
IS36	10/-	2091 10/-	941 12/6	943 12/6	757 7/8 3 a £1	12AR	5/-	3 a £1	EF130	5/-	3 a £1	
IS37	10/-	2092 10/-	942 12/6	944 12/6	758 7/8 3 a £1	12AS	5/-	3 a £1	EF131	5/-	3 a £1	
IS38	10/-	2093 10/-	943 12/6	945 12/6	759 7/8 3 a £1	12AT	5/-	3 a £1	EF132	5/-	3 a £1	
IS39	10/-	2094 10/-	944 12/6	946 12/6	760 7/8 3 a £1	12AU	5/-	3 a £1	EF133	5/-	3 a £1	
IS40	10/-	2095 10/-	945 12/6	947 12/6	761 7/8 3 a £1	12AV	5/-	3 a £1	EF134	5/-	3 a £1	
IS41	10/-	2096 10/-	946 12/6	948 12/6	762 7/8 3 a £1	12AW	5/-	3 a £1	EF135	5/-	3 a £1	
IS42	10/-	2097 10/-	947 12/6	949 12/6	763 7/8 3 a £1	12AX	5/-	3 a £1	EF136	5/-	3 a £1	
IS43	10/-	2098 10/-	948 12/6	950 12/6	764 7/8 3 a £1	12AY	5/-	3 a £1	EF137	5/-	3 a £1	
IS44	10/-	2099 10/-	949 12/6	951 12/6	765 7/8 3 a £1	12AZ	5/-	3 a £1	EF138	5/-	3 a £1	
IS45	10/-	2100 10/-	950 12/6	952 12/6	766 7/8 3 a £1	12BA	5/-	3 a £1	EF139	5/-	3 a £1	
IS46	10/-	2101 10/-	951 12/6	953 12/6	767 7/8 3 a £1	12BB	5/-	3 a £1	EF140	5/-	3 a £1	
IS47	10/-	2102 10/-	952 12/6	954 12/6	768 7/8 3 a £1	12BC	5/-	3 a £1	EF141	5/-	3 a £1	
IS48	10/-	2103 10/-	953 12/6	955 12/6	769 7/8 3 a £1	12BD	5/-	3 a £1	EF142	5/-	3 a £1	
IS49	10/-	2104 10/-	954 12/6	956 12/6	770 7/8 3 a £1	12BE	5/-	3 a £1	EF143	5/-	3 a £1	
IS50	10/-	2105 10/-	955 12/6	957 12/6	771 7/8 3 a £1	12BF	5/-	3 a £1	EF144	5/-	3 a £1	
IS51	10/-	2106 10/-	956 12/6	958 12/6	772 7/8 3 a £1	12BG	5/-	3 a £1	EF145	5/-	3 a £1	
IS52	10/-	2107 10/-	957 12/6	959 12/6	773 7/8 3 a £1	12BH	5/-	3 a £1	EF146	5/-	3 a £1	
IS53	10/-	2108 10/-	958 12/6	960 12/6	774 7/8 3 a £1	12BI	5/-	3 a £1	EF147	5/-	3 a £1	
IS54	10/-	2109 10/-	959 12/6	961 12/6	775 7/8 3 a £1	12BJ	5/-	3 a £1	EF148	5/-	3 a £1	
IS55	10/-	2110 10/-	960 12/6	962 12/6	776 7/8 3 a £1	12BK	5/-	3 a £1	EF149	5/-	3 a £1	
IS56	10/-	2111 10/-	961 12/6	963 12/6	777 7/8 3 a £1	12BL	5/-	3 a £1	EF150	5/-	3 a £1	
IS57	10/-	2112 10/-	962 12/6	964 12/6	778 7/8 3 a £1	12BM	5/-	3 a £1	EF151	5/-	3 a £1	
IS58	10/-	2113 10/-	963 12/6	965 12/6	779 7/8 3 a £1	12BN	5/-	3 a £1	EF152	5/-	3 a £1	
IS59	10/-	2114 10/-	964 12/6	966 12/6	780 7/8 3 a £1	12BO	5/-	3 a £1	EF153	5/-	3 a £1	
IS60	10/-	2115 10/-	965 12/6	967 12/6	781 7/8 3 a £1	12BP	5/-	3 a £1	EF154	5/-	3 a £1	
IS61	10/-	2116 10/-	966 12/6	968 12/6	782 7/8 3 a £1	12BQ	5/-	3 a £1	EF155	5/-	3 a £1	
IS62	10/-	2117 10/-	967 12/6	969 12/6	783 7/8 3 a £1	12BR	5/-	3 a £1	EF156	5/-	3 a £1	
IS63	10/-	2118 10/-	968 12/6	970 12/6	784 7/8 3 a £1	12BS	5/-	3 a £1	EF157	5/-	3 a £1	
IS64	10/-	2119 10/-	969 12/6	971 12/6	785 7/8 3 a £1	12BT	5/-	3 a £1	EF158	5/-	3 a £1	
IS65	10/-	2120 10/-	970 12/6	972 12/6	786 7/8 3 a £1	12BU	5/-	3 a £1	EF159	5/-	3 a £1	
IS66	10/-	2121 10/-	971 12/6	973 12/6	787 7/8 3 a £1	12BV	5/-	3 a £1	EF160	5/-	3 a £1	
IS67	10/-	2122 10/-	972 12/6	974 12/6	788 7/8 3 a £1	12BW	5/-	3 a £1	EF161	5/-	3 a £1	
IS68	10/-	2123 10/-	973 12/6	975 12/6	789 7/8 3 a £1	12BX	5/-	3 a £1	EF162	5/-	3 a £1	
IS69	10/-	2124 10/-	974 12/6	976 12/6	790 7/8 3 a £1	12BY	5/-	3 a £1	EF163	5/-	3 a £1	
IS70	10/-	2125 10/-	975 12/6	977 12/6	791 7/8 3 a £1	12BZ	5/-	3 a £1	EF164	5/-	3 a £1	
IS71	10/-	2126 10/-	976 12/6	978 12/6	792 7/8 3 a £1	12CA	5/-	3 a £1	EF165	5/-	3 a £1	
IS72	10/-	2127 10/-	977 12/6	979 12/6	793 7/8 3 a £1	12CB	5/-	3 a £1	EF166	5/-	3 a £1	
IS73	10/-	2128 10/-	978 12/6	980 12/6	794 7/8 3 a £1	12CC	5/-	3 a £1	EF167	5/-	3 a £1	
IS74	10/-	2129 10/-	979 12/6	981 12/6	795 7/8 3 a £1	12CD	5/-	3 a £1	EF168	5/-	3 a £1	
IS75	10/-	2130 10/-	980 12/6	982 12/6	796 7/8 3 a £1	12CE	5/-	3 a £1	EF169	5/-	3 a £1	
IS76	10/-	2131 10/-	981 12/6	983 12/6	797 7/8 3 a £1	12CF	5/-	3 a £1	EF170	5/-	3 a £1	
IS77	10/-	2132 10/-	982 12/6	984 12/6	798 7/8 3 a £1	12CG	5/-	3 a £1	EF171	5/-	3 a £1	
IS78	10/-	2133 10/-	983 12/6	985 12/6	799 7/8 3 a £1	12CH	5/-	3 a £1	EF172	5/-	3 a £1	
IS79	10/-	2134 10/-	984 12/6	986 12/6	800 7/8 3 a £1	12CI	5/-	3 a £1	EF173	5/-	3 a £1	
IS80	10/-	2135 10/-	985 12/6	987 12/6	801 7/8 3 a £1	12CJ	5/-	3 a £1	EF174	5/-	3 a £1	
IS81	10/-	2136 10/-	986 12/6	988 12/6	802 7/8 3 a £1	12CK	5/-	3 a £1	EF175	5/-	3 a £1	
IS82	10/-	2137 10/-	987 12/6	989 12/6	803 7/8 3 a £1	12CL	5/-	3 a £1	EF176	5/-	3 a £1	
IS83	10/-	2138 10/-	988 12/6	990 12/6	804 7/8 3 a £1	12CM	5/-	3 a £1	EF177	5/-	3 a £1	
IS84	10/-	2139 10/-	989 12/6	991 12/6	805 7/8 3 a £1	12CN	5/-	3 a £1	EF178	5/-	3 a £1	
IS85	10/-	2140 10/-	990 12/6	9								

4 oz. Reels			
16 B & S Enamel	9/8	25 B & S Enamel	9/6
18 B & S Enamel	8/3	28 B & S Enamel	13/4
20 B & S Enamel	9/6	30 B & S Enamel	13/8
22 B & S Enamel	10/-	33 B & S Enamel	10/6
24 B & S Enamel	10/6	36 B & S Enamel	27/-

**TV BALLUN**

ABL 300 TV Ballun 1984 16.77 1985 16.77 1986 16.77 1987 16.77 1988 16.77 1989 16.77 1990 16.77

UR67 60 ohm  $\frac{1}{2}$  in. diam. coaxial cable, 1/8  
yd. or 25/- per 25 yds. roll. 10/- postage.  
UR43 50 ohm 3/16 in. diam. coaxial cable 16/-  
per 35 ft. roll.  
UR71 75 ohm  $\frac{1}{4}$  in. diam. coaxial cable, 1/8  
yd. or £1 per 27 yds. roll.

All above cables are in as new condition.

Lafayette TE-18 G.D.O. 8 Bands, Plug in Coils  
360 Kc.-220 Mc., 240 volt ..... \$19/15/-  
Leader LDM-810 G.D.O. 2-230 Mc., 8 Band,  
Plug-in Coils, 230 volt ..... \$22/5/-

Designed to cut round or square holes in sheet metal, with instructions 78/

Label No. 4 Alignment Tool Kits. All popular sizes, 4 Tools in Plastic Pouch ... 11/-

AMERICAN TYPE			
PL259	Coaxial Plug	(PL259, PTFE)	9/16"
4087-1	Coaxial Plug	(PL259, PTFE)	14/16"
SC239	Coaxial Socket	(Suit PL259)	9/16"
4087-1	Coaxial Socket	(PTFE)	14/16"
CS2-14	Coaxial Dble. ended female Cable Joiner (PTFE)		17/16"
UG175	Adapter for PLT59 to suit 1/4" in. Cable		2 3/8"
CS2-17	Coaxial "T" Piece suit PL259		9/16"
BNC Series:			
UG 8/C	Coaxial Plug (PTFE)		15/16"
UG8-C/U	Coaxial Socket (PTFE)		15/16"
Selling Lot:			
Coaxial Plug	(Suit 1/4" in. Cable)		9/16"
Coaxial Socket			9/16"
Coaxial Socket	(flush mount)		3/4"
Coaxial Plug	(female)		3/4"

Polymax Unbreakable Stand-off Insulators, 1/2 in., 1 in., 1 1/2 in., 2 in., 2 1/2 in., 3 in.		
Aegis 2.5 mH. RF Chokes	4/9	
750 volt Glass Neon Breaks	5/9	

RC2	Midget RF Iron Cind	100	1000	1.000	0.002	0.002	10/-
RC4	Standard Medium Gain	100	1000	0.000	1.000	0.002	10/-
RC5	Standard High Gain	100	1000	0.000	1.000	0.002	10/-
RC6	Midget Rhenartz Coil	1000	1000	0.002	0.002	0.002	10/-

AC2	Aerial Coil, Midget	10/-
AC3	Aerial Coil, No. 2 Band Pass	10/-
AC4	Medium Gain Standard	10/-
AC9	Standard No. 2 Band Pass	13/-

01	IRS on 100K Res. 485 Kc, IF					/
02	IRS, 6J8, 1A7, etc., Midget					10/
04	ECH33-6AN7-XOIM-6AE8 Midget					10/
05	6SA7 Midget					10/
07	6J8, 6A8, etc., Standard					10/

IF 14-15 S. and Gen. Pur. 1960 Kc. ....	12/
IF34 10.7 Mc. Wide Band (FM No. 1) ....	12/
IF35 10.7 Mc. Wide Band (FM No. 2) ....	17/
IF36 10.7 Mc. Ratio Detector ....	17/

SWA16T 16-50 metres, Aerial	0012	45.00	5.50	7/6
SWR16 16-50 metres, RF	0013	45.00	5.00	7/6
SWR16 16-50 metres oscillator	0014	25.00	4.00	7/6

or £1 per set.

Brand New.	Bankrupt Stock.	Well-known Make.
3 in. Twin Cone, 10 w. 15 ohm V.C.	£3/10/-	
3 in. Twin Cone, 4 w. Tweeter 15 ohm V.C.	£2/5/-	
6 in. Speakers, 3.5 or 15 ohm	£2/-	
3 in. Speakers, 3.5 ohm	£1/6/-	

Microphone Plugs, P.M.G. Type Standard	4/-
Socket to suit above	3/6
Transistor Radio Type Plug and Jack,	3/6
4 pin small speaker plugs and sockets, 1/8	pr
Ampenol 3-pin connectors	5/-

24 ft. high. Eight 3-ft. rods,  $\frac{3}{4}$ -in. diam., guy ropes and pegs, etc. £3. for rail

**North Balwyn tram passes corner.** **Money Orders and Postal Notes payable North Hawthorn P.O.**  
We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.

# "AMATEUR RADIO"

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

NOVEMBER 1965

Vol. 33, No. 11

## Editor:

K. M. COCKING ..... VK2ZPQ

## Assistant Editor:

K. E. Pincott ..... VK2AFJ

## Publications Committee:

G. W. Baly (Secretary) ..... VK2AOM

A. W. Chandler (Circulation) ..... VK3LC

S. T. Clark ..... VK3ASC

E. C. Manifold ..... VK3EM

W. E. J. Roper ..... VK3ARZ

## Advertising Enquiries:

C/o P.O. Box 34, East Melbourne, C.2, Vic.

Mrs. BELLARS, Phone 41-3533, 478 Victoria

Parade, East Melbourne, C.2, Victoria. Hours

10 a.m. to 3 p.m. only.

## Publishers:

VICTORIAN DIVISION W.I.A.,

Reg. Office: 88a Franklin St., Melbourne, Vic.

## Printers:

"RICHMOND CHRONICLE" Phone 42-5419.

Shakespeare St., Richmond, E.1, Vic.

★

All matters pertaining to "A.R.", other than subscriptions, should be addressed to:

## THE EDITOR,

"AMATEUR RADIO,"

P.O. BOX 34,

EAST MELBOURNE, C.2, VIC.

Acknowledgments will be sent following the Committee meeting on the second Monday of each month. All Sub-Editors should forward their articles to reach "A.R." before the 10th of each month. Any item received after the Committee meeting will be held over until the next month. Publication of any item is dependent upon space availability, but in general about two months may elapse before a technical article is published after consideration by the Publications Committee.

★

Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Non members of the W.I.A. should write to the Victorian Division, C/o P.O. Box 34, East Melbourne. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence, in addition "A.R." should also be notified. A convenient form is provided in the "Call Book".

★

Direct subscription rate is 30/- a year, post paid, in advance. Issued monthly on the first of the month. January edition excepted.

★

## OUR COVER

W.I.C.E.N. repeater, mobile and link set-up at Mt. Alexander, 20 miles south of Bendigo. Left to right: VKs 3Z1S, 3ZCO, 3ZEL, 3ARZ.

## FEDERAL COMMENT

★

Over the past year or two the emergence of the Youth Radio Scheme can reasonably be ranked as one of the more dynamic occurrences within the Institute.

From our point of view it can reasonably be assumed that the Y.R.S. member of today will become the active Institute member of the future and that, by the process of natural selection, some of these future members will eventually shoulder the vital administrative work of our organisation.

But might it not be to our advantage if we pondered on the wider implications involved? Especially the part now played by the local radio club or society. Most of these radio clubs—and there are eighty-six of them listed in last year's Call Book—came into existence because there was a need for a local organisation to cater for the gregarious, sociability and educational needs of the Amateur. Services which at times the Institute is often ill equipped to supply on a local basis.

Once formed there exists a strong probability that some of the members of such clubs will also become Institute members and what better place to find people who must—if the Institute is to remain viable—carry part of the burden of running it?

The A.R.R.L., the R.S.G.B., the N.Z.A.R.T.—to mention but a few of the better known national Amateur organisations—exist by virtue of their local branches and clubs. Conceptually they are the co-ordinating bodies which exist primarily to guide, foster and speak for the local "chapters."

Perhaps we would do well to consider the many advantages our Institute now enjoys because of the existence of the local radio clubs and how much greater these advantages might be if we actively supported the formation of more of them.

HAROLD L. HEPBURN, Federal Vice-President, W.I.A.

## CONTENTS

Correct Way to Modify Pye Reporters, Mk. 1 and 2 .....	3	Book Review: Amateur Radio Circuits Book .....	17
A Low Cost Tilttable Mast and Tower .....	6	S.s.b. Equipment .....	17
Two-Band V.h.f. Converter .....	7	Radio and Television Receiver Circuit and Operation .....	17
A Silencer for P.E. Charger Unit .....	10	Communication Receivers .....	17
A Transistor Transceiver for 144 Mc. ....	11	Maths. for those that hate it .....	17
8236 Power Pentode for S.s.b. Transceivers .....	13	Correspondence .....	18
New Call Signs .....	14	Sideband .....	19
Sideband Sketches: Dudley Nourse, VK2DQ .....	14	DX .....	20
A Transistor Crystal Checker .....	15	V.H.F. ....	21
An Economical Transistor Power Supply .....	15	S.W.L. ....	22
		Publications Committee Reports .....	22
		Youth Radio Clubs .....	23
		Youth Radio Scheme .....	23
		Federal and Divisional Monthly News Reports .....	24

# Mullard TRANSMITTING VALVES FOR SSB

## ARE YOU DISSATISFIED WITH YOUR AM RIG?

With a suitable multi-band exciter followed by a linear amplifier selected from the range of Mullard Transmitting Valves listed below, you can join the growing ranks of sidebanders and get your fair share of DX!

### LINEAR RF POWER AMPLIFIER SSB SUPPRESSED CARRIER SERVICE

Valve Type Number	V <sub>a</sub>	I <sub>a</sub> (at)	P (load) (driver)	PEP (load)
		mA	W	W
QV06-20	600	26	0.25	46
QV08-100	750	130	1.5	230
QV08-200	600	150	1.5	240
QV2-250C	2000	100	1.5	300
QY3-65	3000	15	1.0	130
QY3-125	3000	23	1.0	228
QY4-250	4000	50	1.0	454
YL1150	600	100	1.0	109

More detailed information on these valve types may be found in the Mullard Technical Handbook, Volume 3.

The following types are used extensively in SSB transmitters of American manufacture and are now available from Mullard for maintenance purposes—

6DQ5 6HF5 8236



**Mullard-Australia Pty. Ltd.**

31-43 CLARENCE STREET, STONEY, N.S.W. 21 0004  
123 VICTORIA PARADE, COLLINGWOOD, V.I. VIC. 41 0044  
Associated with MULLARD LIMITED, LONDON



YL1150



QV2-250C

BARRY WOOTTEN,\* VK3AK, and CYRIL MAUDE,† VK3ZCK

A NUMBER of articles dealing with the Pye Reporter Mk. 1 and Mk. 2 have been quite regular in appearance over the past months, and in collaboration with Cyril VK3ZCK, I hope to help those who either worked and altered their own units, or had someone else do it for them, or intend doing it in the near future to do a complete check of both tx and rx. Cyril will give details of the coils and component alterations, including a circuit diagram of the NSA test set.

### MODIFICATIONS TO UNIT PRIOR TO TUNE UP

### MODIFICATION TO COILS

- L1—6AK5 V1 Grid coil (53 Mc.), 11 turns, tap 24\*  
L2—6AK5 V1 Plate coil (53 Mc.), 7 turns.  
L3—6AU6 V3 Grid coil (45 Mc.), 8 turns, tap 2-3†  
L4—6AU6 V2 Plate coil (37 Mc.), 9 turns.  
L5—6AU6 V4 Plate coil (12.5 Mc.), 12 turns.  
L12—Antenna Link, unchanged.  
L13—6J6 V10 Plate coil (53 Mc.), 11 turns.  
L14—6J6 V10 Grid coil (53 Mc.), unchanged.  
L15—6AQ5 V11 Plate coil (53 Mc.), 5 turns.  
L16—6AU6 V12 Plate coil (26 Mc.), 20 turns.

\* Tap position can be varied if the need be to improve signal.

† Tap position should be varied as described under tuning up.

† In some sets this coil need only be 15 turns, but in all cases the fixed capacitor 5 pF. and any others across coil or from pin of V12 to earth should be removed, and all tuning done with an iron dust slug. The wire used in the coil should be of such a gauge that it just fills the space between the slugs.

Do not at this stage touch the neutralising capacitors.

### MINOR CIRCUIT CHANGES NEEDED TO IMPROVE PERFORMANCE

V9 8AQ5, the receiver audio and modulator tube. The two cathode resistors, 470 ohms and 150 ohms, should be transposed so that the 150 ohms resistor is on the cathode and the 470 ohms goes to earth.

V11 6AQ5 doubler/driver. The 100K screen resistor can be reduced to 27K to improve drive to the p.a. tube.

The 220 ohms w.w. resistor on the cathode of V10 6J6 should not be altered as it provides protective bias to the tube.

If it is necessary to replace the double button carbon mike with a single button type, the 25  $\mu$ F. 12v. condenser be shorted out and the mike connected between black and white leads.

One way of increasing the h.t. supply is to replace your 12 v. vibrator with a 6 v. version of the same type but connecting a 14 ohm w.w. resistor between the field pin and battery.

Another way of getting increased drive to the P.A. tube is to replace the 6AQ5 V1 with a 6DL5 adjusting the heater balanced resistors accordingly. If increased r.f. output is required, remove the 6J6 valve, the two neutralising condensers and the 7-pin ceramic enlarger. The hole to take a 9-pin ceramic or similar valve socket, connect L14 to pins 1 and 3 and L13 to pins 6 and 8, the heater lead is then connected to the centre tap (pin 9) and pins 4 and 5 are earthed. Connect the 220 ohm bias resistor to pin 2 and a 1500 ohm 1 w. resistor to pin 7, and modulated b.t.

Plug in QQE02/5 adjust heater balance resistor accordingly. This will give about three times the r.f. output for the same d.c. input. The use of a QQE03/12 is not recommended as it places undue strain on the power supply.

V1 receiver r.f. amplifier tube can be replaced with the following tube without any circuit modification. M8100 a ruggedised version of the 6AK5 or the triode 6GK5 or 6FM5 which may require neutralising.

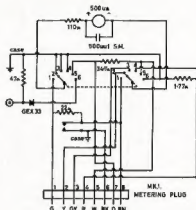


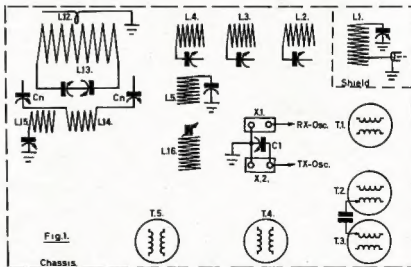
FIG. 2. USA WINDS TALL-CLAW

- Switch positions:—  
1—Receiver tune.  
2—Oscillator drive.  
3—N.C. Mkt. 1.  
4—P.a. grid drive.  
5—P.a. plate current.  
6—Field strength meter.

### ALIGNMENT OF RECEIVER

It is best before doing this to make these checks first.

1. Check the audio output of the rx. This is common practice, and numerous methods are used. After satisfying yourself that the audio is all right.
2. Check the 2nd i.f. strip. To do this touch the end of a screwdriver to



Coil Locations and modified winding data.

- L1-53 Mc., 11 turns.  
L3-53 Mc., 7 turns.  
L3-45 Mc., 8 turns.  
L4-37.5 Mc., 9 turns.  
L5-37.5 Mc., 12 turns.  
L12-Link, unchanged.  
L13-53 Mc., 11 turns.  
L14-53 Mc., unchanged.

- L15—53 Mc., 5 turns.  
L16—25 Mc., 20 turns.  
X1—12.533 Mc., Rx Crystal.  
X2—13.258 Mc., Tx Crystal.  
C1—3-30 pF. zeroing trimmer.  
CN—Neutralization trimmer.  
T1—1st i.f.t., 15.6 Mc.  
T2-T5—2nd i.f.t., 2.9 Mc.

\* 8 McKenna St., Avondale Heights, Vic.  
† 2 Clarendon St., Avondale Heights, Vic.





the grid of the 2nd mixer (V5 pin 2). This should produce reasonably loud clicks in the output. If nothing is there, check all valves in the i.f. section.

3. Check the 1st i.f. This is much the same as the former, the end of a screw-driver to the grid of the 1st mixer (V3 pin 2). Once again response should be noticed.

The equipment used in aligning the units will undoubtedly be varied, but if an accurate signal generator is available the better the results will be.

A multimeter is also required unless you can beg, borrow or steal an output meter whose load can be adjusted to 3-5 ohms.

Set the range of the multimeter to the lowest a.c. range (0-1 volt if yours goes that low) and connect across the voice coil of the speaker, taking care neither lead shorts to the frame, this will cause feedback in the rx and an audio spark will result.

Right, you have all these, here goes.

## 2nd I.F. ALIGNMENT

Feed the output of the signal generator (2.9 Mc.) via a 2200 pF. condenser to the grid of 2nd mixer (V5 pin 2). Check the frequency of the signal generator against a crystal marker oscillator. To produce a zero beat, loosely couple the oscillator to the grid of V5, turn off the modulation from the signal generator, and as you tune either side of 2.9 Mc. you will hear when zero is reached. Remove the marker oscillator and turn it off. Set the depth of modulation to 30% at 400  $\mu$ V. on the signal generator.

Turn volume control down as you increase output generator. Align primaries and secondaries of T2, T3, T4 and T5 to resonate on 2.9 Mc. Maintain output from generator so the a.f. does not exceed 25 mW. (approx. 0.3v.).

Unscrew primary cores of T2, T3, T4 and T5 fully. Primary cores are on the underside of chassis.

Tune T5, T4, T3 and T2 secondaries (top slugs) in that order for maximum a.f. output, repeat, with reduced signal generator input to approx. 0.3 volt a.f. output.

Tune primary of T5, T4, T3 and T2 in that order for maximum output, keeping the output "constant" by reducing signal generator input.

Adjust signal generator output for 25 mW. (0.3 volt). Re-peak primary of T3 (top) for maximum output.

The sensitivity should be between 120-200  $\mu$ V. for an output of 25 mW. (0.3 volt).

Increase the signal generator output by 6 db. (X2) and detune the signal generator on either side of the carrier, until output reads 25 mW. (0.3 volt) again. This should be between 13 Kc. off tune. (13 Kc.-18 Kc. for 60 Kc. i.f., 26 Kc.-32 Kc. for 120 Kc. i.f.) Increase the output of the signal generator 60 db. (X 1000). Detune the signal generator until 25 mW. (0.3 volt) is obtained, bandwidth should be 42-60 Kc., 84-120 Kc.

If re-adjustments are necessary, repeat operations as many times as is required to obtain correct results.

As quite a lot of the units will be a little worse for wear and if these re-

sults are not obtained, check the valves in the i.f. section for low emission, especially the 6AV6.

## 1st I.F. ALIGNMENT

Tune signal generator to the range covering up to 16 Mc. Feed the output via a 2200 pF. condenser to grid of V3 pin 2, adjust signal generator to crystal frequency + 2.9 Mc. = 15.433 Mc. Adjust top and bottom slugs in T1 for maximum a.f. output.

Some units have two Philips' trimmer condensers fitted. Tune the one nearest to L1 first. Re-check the adjustment of the signal generator, and adjust a.f. output to 25 mW. (0.3 volts). Sensitivity should be within range of 5-18  $\mu$ V.

A long process? Well, you are half-way there. This alignment is where the overall sensitivity comes from. Now on to the r.f. section.

## R.F. SECTION

Care must be taken here as wrong peaks from the signal generator can be picked up. If you have a friend, whose unit is already converted, you will save some time. For those who have to do battle alone, these personal hints will help. This is where an accurate signal generator pays off.

Tune the signal generator to the required frequency 53 Mc. If you are using ordinary shielded cable, discard, and fit a length of 52 ohm co-axial RG58AU to the signal generator. Feed output of signal generator to antenna socket, and tune to maximum output. Check your modification again, also change-over relay. When all is O.K. and you have found that you made no mistakes, turn audio control flat out.

The friend with his unit can have first go. Depress the mic. p.t.t. switch (hoping he did not forget to use a dummy load on his tx), now adjust harmonic amplifier anode tuning (C9 across L3), here you should start to hear the tx. If necessary reduce audio and tell your friend to shift his tx further away, now tune mixer grid tuning (C10 L4). The noise from the tx should be getting quite loud now, so tune r.f. anode and r.f. grid tuning condensers (C7 L2 and C1 L1) and after replacing your speaker and output meter you can now do a final peak with the signal generator.

Let's go back to the lone battler. Right, tune output harmonic amplifier tuning (C9, L3) slowly and put your ear near the speaker, an audio note should be heard. If not, leave in about two-thirds mesh and adjust mixer grid (C10 L4), the audio should be quite noticeable here. If necessary reduce signal generator input and adjust r.f. grid tuning (C7 L1) together.

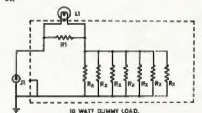
Now check tuning of signal generator and go over all condensers and peak to maximum a.f. output. Check tap on r.f. grid coil (L1) and after making sure the tap is optimum, and the frequency O.K., check the sensitivity. This should be between 1-3  $\mu$ V. If this is not so, check the peaking of the r.f. section, and the valves. An M8100 can replace V1 and you should reach the sensitivity figure.

The oscillator coil L5 can now be adjusted. This has little effect on overall gain. Some inform me that they cannot get a peak, don't worry, tune the slug in the coil, and if you notice an increase, good.

Well, that's the rx. A point I would like to mention here is that a lot of Ham's have hotbed the power supply and shorted out the 15K w.w. a.f. dropping resistor to increase rx h.t. This is quite O.K., but the 6AK5 (V1) plate and screen volts should not exceed the limits. If it is necessary, increase the 15K R4 and 68K R3 V1 anode and screen resistors to maintain correct volts, about 120 volts on plate. If the M8100 is used this is most necessary. The M8100 is a premium quality 6AK5 and gives excellent results used here.

## TRANSMITTER SECTION

This should present no problems, if the coil modifications as listed have been followed. Before we go any further, for those who are a little more ambitious than others, may I humbly recommend the building of the N5A, this might take up some time, but in the long run will be more than worth it.



- 30 ohm or 50 ohm feeder:
- R1-30 ohms 3 w.
- R2-150 ohms 1 w. carbon resistors (seven resistors).
- L1-12 volt 3 w. pea lamp.
- 75 ohm feeder:
- R1-30 ohm 3 w.
- R2-30 ohm 2 w. carbon resistors (six resistors).
- L1-12 volt 3 w. pea lamp.
- J1-Antenna connector.

Unit should be enclosed with connector at one end and lamp at the other. Case should be earthed to connector as shown.

If you wish, a multimeter can be used. I will list typical readings with the N5A as well as a multimeter.

Those with the multimeter can either use the metering socket and earth or take their reading direct to the metering points.

Position 2, oscillator drive. This is measured at the junction of R54 (100K) and R56 (1K) in multi grid circuit. The reading should be approximately 60-80  $\mu$ A. on N5A and 100  $\mu$ A. on multimeter.

Position 4, multiplier drive. This is measured at junction of 680 ohm and 7.5 ohm w.w. in grid circuit. Reading approx. 100-120  $\mu$ A., and 50  $\mu$ A.

Position 5. This reads p.a. plate current measured across R42 (10 ohms). Reading approx. 100  $\mu$ A. and 700  $\mu$ A.

A dummy load should be used on the output. I have included a circuit and description of a unit that is quite OK to use. In fact, it is a copy of a commercial unit.

With the dummy load in place, press the mic. p.t.t. switch. Now tune L16, (Continued on Page 23)

# A LOW COST TILTABLE MAST AND TOWER

P. E. PLAYSTED,\* VK3APH

IN these days of low sunspot activity a rotatable array on the DX bands becomes very desirable. The principal objections the average Amateur has to getting a rotatable array up are probably: 1, cost; 2, reluctance to make the necessary numerous antenna adjustments at a dangerous height above terra firma.

The mast and tower described attempts to overcome these objections. The cost in materials was approximately £15, to which should be added the fee for hiring a 150 amp. arc welder, welding rods and a few other sundries.

The illustration should make the design details fairly clear, and the author would be happy to answer any queries relating to its construction.

Do not let the are welding involved discourage you, firstly obtain an instruction book (5/- from most suppliers of welding gear) and get a thorough understanding of the basics, then spend an hour or so practising on odd pieces of pipe, etc. You will soon become proficient.

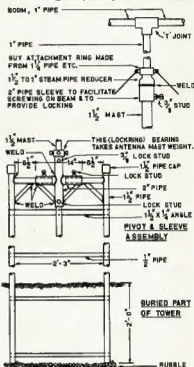
**Materials required for mast and tower:**

- 3 lengths of 1½" water pipe (medium gauge).
- 1 length of 1" water pipe (medium gauge).
- 4 feet of 2" water pipe.
- 5 feet of 1½" x ¼" angle iron.
- Sundries.

It was decided to top the mast with a two element yagi using the popular plumbers' delight type of construction. The array is 38 feet in height and when tilted over comes down to within 6 feet of ground, making the inevitable adjustments and modifications a

very simple matter indeed, compared to working at the top of even a collapsed telescopic tower.

For those who may be interested in the 20 metre yagi used, the boom consists of 1 in. water pipe with a centre T joint and 2 feet of 1 in. electrical seamless conduit butt-welded to the ends of the boom to support the elements. The elements are constructed from 2 lengths (16 ft.) 1 in. o.d. dural



VK3APH TILT-OVER MAST & TOWER

tubing, 3 lengths (16 ft.) 1 in. o.d. tubing at a cost of approx. £7/10/- for the dural. The elements were cut for 14.2 Mc., i.e., director 32 feet, driver element 34 feet and spacing of 0.1 wavelength.

Total beam weight including 5 feet of 1 in. water pipe mast is 40 lb. At present, the array is fed with 800 ohm line with a quarter wavelength matching transformer to a T match, and providing many enjoyable QSO's with local and overseas Hams.



## CRYSTAL PYE DIVISION

Manufacturers of Quartz Crystals for Frequency Control and Crystal Filters for Highly Selective Circuits announce:—

### NEW LOWER PRICES FOR CLOSE TOLERANCE GOLD PLATED CRYSTALS FOR AMATEUR APPLICATIONS

	Amateur Net (each includ. Tax)
• 1.8 Mc. to 14.999 Mc. ±0.005% in Style "D" holders, 1" pin spacing	£2 8 6
• 15 Mc. to 47.999 Mc. ±0.005% in Style "D" holders, 1" pin spacing	£2 10 6
• 48.0 Mc. to 61.0 Mc. ±0.005% in Style "D" holders, 1" pin spacing	£2 16 3
• 100 Kc. ±0.005% in HC13/U holders, 1" pin spacing*	£4 10 0
• 1 Mc. ±0.005% in Style "D" holders, 1" pin spacing*	£4 10 0
* Specially designed for Crystal Calibrator purposes.	
• 455 Kc. nominal Crystals for Filter applications in Style "D" or "E" (B7G) holders	£4 10 0

Many other types and tolerances are available from our standard production. Please consult us on your Crystal requirements.

**PYE PTY. LTD. CRYSTAL DIVISION**

1A KILPA ROAD, MOORABBIN, VIC. Phones 95-2011, 95-6741  
STATE OFFICES IN ADELAIDE, BRIEBANE, HOBART, PERTH AND SYDNEY



# TWO-BAND V.H.F. CONVERTER

ROY F. LESTER,\* VK2ZRL

THIS converter is the result of efforts to overcome some of the problems peculiar to v.h.f. mobile operation in the Sydney and South Coast area of VK2.

Basically the problem was:

- to operate 6 and 2 m. mobile with easy band changing;
- to operate on 2 m. without Channel 5A Wollongong occupying most of the bottom megacycle of the band.

I had been fortunate enough to acquire a 46 Mcs. crystal. Used in a six metre converter to tune 52 to 54 Mcs., this gives a tunable i.f. of 6 to 8 Mcs. It occurred to me that I could also use the first harmonic of the xtal osc. (92 Mcs.) in a two metre converter, tuning 144 to 146 Mcs., the i.f. in this case being 52 to 54 Mcs. By feeding the output of the 2 mx converter into the 6 mx converter I would then have double conversion on 2 mx. This double conversion would, I thought, help to keep out the interference from Chan. 5A.

After a little experimentation, the circuit shown here was decided upon, and has proved to be a fine mobile converter.

The 6 mx converter consists of a 6EJ7 r.f. amplifier, 6BL8 mixer and cathode follower, and half 12AT7 as a

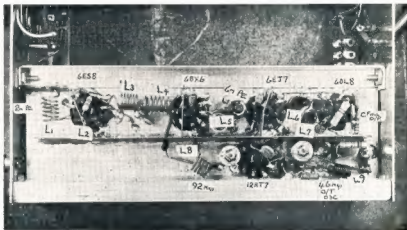
Robert Dollar type xtal osc. On 2 mx a 6ES8 is used as a cascade r.f. amp., 6BX6 mixer and the other half 12AT7 is a doubler. The block diagram shows the general arrangement. Tube types may be varied to suit your junk box or favourite circuit.

The 6EJ7 6 mx r.f. amp. is an excellent valve, but as it has quite high gain, proper attention must be paid to by-passing and shielding. (Other suitable valves would be 6AK5, 6CB6, 7

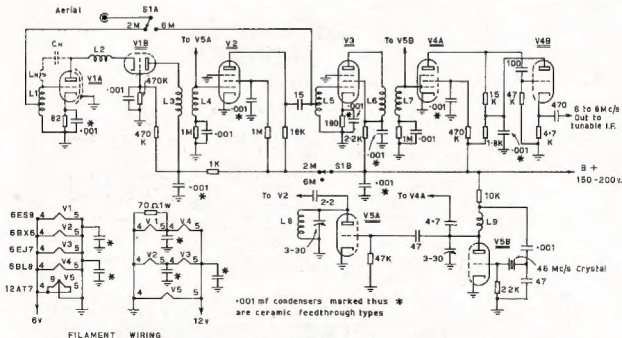
pin, 6BX6, 6EH7, 9 pin, but if using any of these types don't forget to add a suitable screen resistor and by-pass.)

It will be noticed that no h.t. is applied to the 12AT7 doubler stage. This stage is used as a form of diode multiplier and will give all the injection needed.

I did not find it necessary to neutralise the 6ES8, but if required Ln and Cn, shown dotted in diagram, may be added.



\* Flat 70, Block 11, Villawood Road, Villawood, N.S.W.



2 BAND V.H.F. CONVERTER

# FOSTER DYNAMIC MICROPHONES FOR HAND-DESK USE



DF-2

## SPECIFICATIONS:

Output Impedance ..... 50 ohms or 50K ohms  
Effective output level .... —55 db. [0 db. — (one) 1V. Microbar]  
Frequency response ..... 200 to 10,000 c.p.s.

## OMNI-DIRECTIONAL DYNAMIC:

SIZE: 3" x 2-1/8" x 1".  
Cable: 12 ft. of P.V.C.  
Switch: on-off.  
Desk Stand. Clip folds for hand use.  
Colour: WHITE.  
Plastic Diaphragm.

Retail Price  
50K ohms  
**£2/10/7**  
+ Sales Tax 5/3

A QUALITY PRODUCT OF EXCELLENT DESIGN



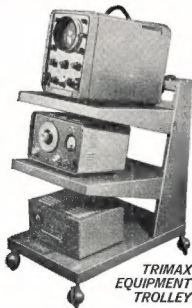
Marketed by **ZEPHYR PRODUCTS PTY. LTD.**

58 HIGH STREET, GLEN IRIS, S.E.6, VICTORIA

Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

Agents: D. K. Northover & Co.; Neil Muller Ltd.; Homcrafts (Tas.) P/L; Jacoby, Mitchell & Co. P/L; T. H. Martin P/L.



TRIMAX  
EQUIPMENT  
TROLLEY

**SMOOTHEST  
MOVEMENT**  
*brings Australia-wide  
acceptance!*

Success shown by Australia-wide sales of the Trimax Laboratory Equipment Trolley is due to functional design, use of high quality rubber tyred swivelling castors, and finest workmanship.

Fitted (as illustrated), the unit is ideal for moving heavy electronic test equipment. By inverting the shelves, the unit becomes an ideal mobile production trolley with deep, easily accessible trays.

Made in standard order, the Trolley is finished in grey hammertone metal. Available with or without three mains outlet sockets which allows mains-operated equipment to be supplied by one extension lead.

Trolley supplied in easy-to-assemble knock-down form for economic transport.



**LM ERICSSON PTY. LTD.**  
"TRIMAX" DIVISION

FACTORY: CNR, WILLIAMS RD. & CHARLES ST., NORTH COBURG, VICTORIA. PHONE: 35-1362 ... TELEGRAPHIC ADDRESS: "TRIMAX" MELB.



My converter was built on a piece of tinfoil 9 in. x 3 in. and the layout and shielding can be seen in the photographs and layout diagram. Use was made throughout of ceramic feed-through condensers so that de-coupling resistors, cathode resistors, etc., could be mounted above the chassis, thereby saving space below.

No detailed construction notes have been given here as I think most Amateurs have their own ideas. The photos and diagrams show the parts layout quite well and reference to recent articles in "A.R.," "QST," etc., will help those who are unfamiliar with v.h.f. techniques.

To tune up the converter, first apply h.t. and switch the band-switch to 6 mc. Adjust the overtone osc. trimmer for proper overtone operation, then the 6 mc coils may be peaked for flat response over the band. Now turn the band-switch to 2 mc, peak the 92 Mcs. trimmer for max. injection, and adjust 2 mc coils for flat response from 144 to 146 Mcs., best signal-to-noise ratio, etc. If g.d.o. is available, check the frequency of all coils before applying h.t. The overtone osc. coil should resonate at a frequency a little higher than the crystal frequencies.

A 52 Mcs. coil was originally wired into the 2 mc mixer plate circuit, but it proved to be very sharp and had a damping effect on the 6 mc aerial coil when tuned spot-on. It has been removed and replaced with a resistor and a small condenser coupling to the 6 mc aerial coil. As there is plenty of gain in the following sections, this worked out very satisfactorily.

Band-changing switches the aerial to the appropriate converter and applies h.t. to the 2 mc r.f. amp. and mixer when on 2 mc. For most of my mobile work I use only one aerial. This is a quarter wave-length on 6 mc, used as a three-quarter wave-length on 2 mc.

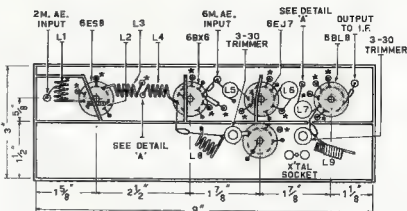
#### COIL DATA

- L1—7 turns 1" diam., tap at 4 t., 20 g.
- L2—10 turns 1" diam., 26 g.
- L3—12 turns 1" diam., 26 g.
- L4—6 turns 1" diam., 20 g.
- L5—8 turns 1" slug, tuned former, tapped at 3 turns, 26 g. enam.
- L6—9 turns 1" slug, tuned former, 26 g. enam.
- L7—8 turns 1" slug, tuned former, 26 g. enam.
- L8—4 turns 1" diam., 20 g.
- L9—9 turns close wound on 1" ferrite slug taken from t.v. i.f. type former.

In operation this converter has proved to be almost free from spurious beats and adjacent channel interference. When operating in high signal strength areas close to Chan. 5A there is still some 5A in the first 100 Kcs. of the band, but none elsewhere and no "birdies" are evident.

Another possibility with this type of circuit would be to use a 47 Mcs. xtal. 50 to 54 Mcs. would then tune from 3 to 7 Mcs. The injection to the 2 mc mixer would be 94 Mcs. (2 x xtal freq.) and the output from the 2 mc section would be 50 to 54 Mcs.

My thanks to Gordon Aiton for the excellent photographs.

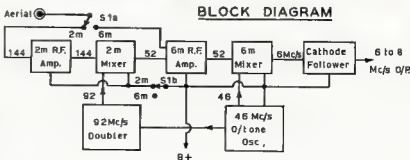
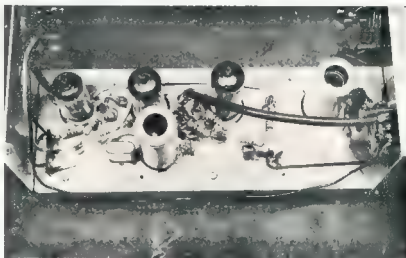


DETAIL "A" SHOWING METHOD OF MOUNTING GRID RESISTORS FOR V2 & V4

Shielded compartments made from tight gauge tinfoil, brass or copper (not aluminum) and soldered to chassis (ditto, heavier gauge). Before fitting, drill holes to take L2 & for leads from osc. section to mixer grids. Leads shown thus  $\rightarrow$  soldered to chassis. Components marked \* are .001 mfd. feedthrough condensers.

#### 2 BAND V.H.F. CONVERTER

Layout diag., underneath view.



# A SILENCER FOR P.E. CHARGER UNIT

E. C. MANIFOLD,\* VK3EM

HAVING procured an "outboard marine" P.E. charger plant for W.I.C.E.N. and other purposes, it was found that the original silencer was far from satisfactory for our requirements. In fact, it just about sent us "up the wall" with the sharp explosive exhaust noise.

Even when a 30 ft. extension lead was obtained, the noise still was penetrating enough to be annoying, and this meant that something had to be done before it was required for any other exercise.

A few minutes with a pencil gave rough outline of what would be necessary for a start, and from there it would be a bit of "cut and try."

Rough reckoning indicated that in size it would have to be near to the capacity of the cylinder and a little more if possible, but as the space available is limited, without spreading out past the rest of the unit, it meant that the silencer would have to be turned to the vertical plane.

This has been done and reference to the drawings will show the sizes and positions of the various pieces.

The outer case slips down over the drilled pipe, and the  $\frac{1}{2}$  in. bolt drops through the top hole and screws down into the plugged end of the pipe. The plug was made from a piece of mild steel rod turned down to size and drilled, then tapped to take a  $\frac{1}{2}$  in. Whit. thread bolt.

For obvious reasons  $\frac{1}{2}$  in. B.S. pipe has been used for the inside section, firstly the pipe was available, also the  $\frac{1}{2}$  in. B.S.P. elbow, and lastly so were the pipe threading dies—obviously the choice.

This quite apart from the fact that the outlet of the unit's exhaust (original system) is screwed for  $\frac{1}{2}$  in. B.S. pipe.

After construction of the various parts, assemble them in the following order, first obtain some graphite grease, and paint the threaded end (of the short elbow pipe end) before screwing into the exhaust port from the engine, to ensure that if necessary it can be removed when service to the engine is required, but don't tighten too tight.

Then paint the end of the drilled pipe and screw into the elbow, after which the other case can be dropped into position and the holding bolt graphited and tightened down firmly but not to an excessive amount (remembering that at some time service will be required) and tightening things too much with the heat and corrosion from the engine usage will make it a hard job to remove.

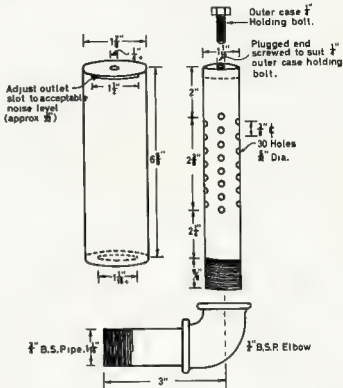
Finally, with the engine running, adjust the size of the exhaust slot at the top of the outer case to give a noise

more like a "choof" rather than the explosive "crack" of the original "pong box."

There have been three of these made and fitted to date with complete satisfaction, as the main noise now is engine noise, and moving away from the unit approximately 20 feet, no direct exhaust noise can be heard, only

the engine and the generator whine, which are quite acceptable while copying signals from the radio gear

Note.—Outboard marine engines and Johnson Chore Horse are similar. With Briggs & Stratton engines a modified installation may be required, but the silencer would be satisfactory for engines in the  $\frac{1}{2}$  to  $\frac{3}{4}$  h.p. group.



## DURALUMIN, ALUMINIUM ALLOY TUBING

IDEAL FOR BEAM AERIALS AND T.V.

★ LIGHT ★ STRONG ★ NON-CORROSIVE

STOCKS NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL DIAMETERS— $\frac{1}{4}$ " TO 3"

Price List on Request

STOCKISTS OF SHEETS—ALL SIZES AND GAUGES

**GUNNERSSEN ALLEN METALS PTY. LTD.**

SALMON STREET,  
PORT MELBOURNE, VIC.

Phone: 64-3351 (10 lines)  
Telegrams: "Metals," Melb.



HANSON ROAD,  
WINGFIELD, S.A.

Phone: 45-6021 (4 lines)  
Telegrams: "Metals," Adel.

# A TRANSISTOR TRANSCEIVER FOR 144 Mc.

HARRY BURTON, ZL2APC

This article was originally published in "Break-In" during January and February. The author has since made modifications to suit Australian conditions. It is the modified version now published.

they are probably available on the Australian market, and also from firms such as Texas Crystals Inc. of U.S.A. If the necessary dollars can be found. My crystal came from the latter source.

The choke CH1 is necessary to ensure that the crystal oscillates on its 5th overtone as intended. This choke, together with the stray capacitance of the crystal holder, should resonate at

about 2 Mcs. above the operating frequency of the crystal, thereby presenting a high parallel impedance at that frequency. At other frequencies the crystal will be shunted by a low impedance and this will prevent oscillation on the fundamental or other frequencies. My crystal exhibited a tendency to oscillate on any frequency except the correct one until this choke was added.

The series trimmer coupling the crystal to the collector controls the feedback and should be adjusted to the minimum value which gives reliable starting of the crystal controlled oscillation.

The doubler final operates in the common or grounded base mode, equivalent to grounded grid in vacuum tube circuits. A link couples the emitter of the final to the oscillator tank, and the resistor-capacitor combination between the cold end of the link and earth seems necessary to give good frequency multiplying efficiency. Some forward d.c. bias is applied to the base of the final. The tank circuit in the collector of the final is link coupled to the aerial via the transmit/receive switch.

To avoid radiation of unwanted signals on 72, 216 and 288 Mcs., a shorted quarter-wave co-axial stub is connected across the feed point at the base of the whip aerial. This stub will present a very high parallel impedance at the frequency for which it is cut, i.e., 144 Mcs., and a low shunt impedance at 72, 216 and 288 Mcs. to attenuate these frequencies. The length of the stub is  $13\frac{1}{2}$  inches approximately for solid dielectric co-axial, but the length should be adjusted for minimum reduction of the output at 144 Mcs.

## THE RECEIVER

The receiver makes use of a super regenerative detector for the maximum

WHEN I decided to go to the 1964 Convention at Christchurch, it seemed that with no vehicle in which to transport any gear I would be unable to announce my presence in Christchurch to those v.h.f. operators I had worked from Wellington. After some cogitation the idea dawned of constructing a hand-held transistorised transceiver for 144 Mcs.

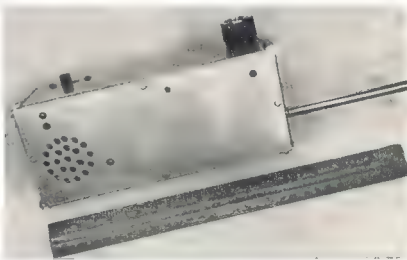
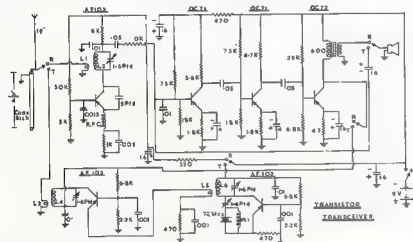
Various periodicals such as "QST" were consulted to ascertain the state of the art in such devices, but not much information was found on transistorised gear for that band. However, the designs available were useful guides. The next thing considered was the availability of suitable low-priced transistors. Type AF102, manufactured by Mullard, was found to be available at a reasonable price. The manufacturer's data claims that this type of

transistor has a gain of 13 db. as an amplifier at 200 Mcs. It appears to be very suitable for use on two metres. Three such transistors are used, one in the receiver and two in the transmitter. Three audio transistors are required, two OC71s and one OC72, making a total of six transistors in the complete unit. The operating controls are reduced to the minimum, an on/off switch and a transmit/receive switch. The input to the final is approximately 30 milliwatts.

## THE TRANSMITTER

The transmitter is quite simple, although crystal controlled. It comprises a crystal oscillator on 72 Mcs. followed by a doubler. The doubler final is collector modulated in an analogous fashion to plate modulation of a vacuum tube final. The purists may shudder at the modulation of a frequency multiplier, but let them shudder.

The 72 Mcs. crystals may not be found in everybody's junk box, but





of efficiency consistent with simplicity and low cost. Before decrying the use of such an elementary receiver, it should be remembered that there is not much point in hearing what you cannot work as could be the case with the combination of a better receiver and a few milliwatts of transmitter power such as is used here. The ranges of receiver and transmitter as described appear to be roughly compatible. Most work with the unit has been done to fixed stations running considerably greater power and equipped with beams and good receivers.

No super regeneration control is shown. A 50K potentiometer in series with the 50K resistor forming part of the base bias network of the AF102 could be tried as a regeneration control. The 5 pF. capacitor coupling collector and emitter, and the emitter r.f. choke are variables to experiment with if good super regeneration proves difficult with certain transistors.

The 8K resistor in series with the collector tank is the load resistor across which the audio voltage is developed. The 0.01 uF. bypass may seem large, but is designed to bypass the quench frequency voltage to prevent it overriding the audio section. A 10K resistor in series with the 0.05 uF coupling capacitor and a further 0.01 uF. bypass to earth at the base of the first audio transistor are further elements in the quench frequency filtering.

No external tuning control is fitted, but the co-axial trimmer used for receiver tuning may be reached by a screwdriver inserted through a hole in one of the panels of the case. My unit was peaked on 144.2 Mcs. and has received stations anywhere in the first megacycle of the band without retuning.

If optimum receiver performance is required it is suggested that an external regeneration control and an external tuning control both be incorporated.

## AUDIO SECTION

This section is quite straightforward. Two cascaded OC71 voltage amplifiers drive an OC72 as a class A audio output stage on receive, and as a Heising modulator on transmit with the OC72 output transformer operating as a modulation choke.

The time constants of the interstage coupling circuits may seem unusual for transistors, but good low frequency response was not required.

A ZC1 moving coil earpiece is used as a speaker on receive and as a microphone on transmit. This unit has an impedance of about 60 ohms.

There is no audio gain control on either receive or transmit. These facilities could be provided if desired at the complication of the transmit/receive switching. A spare pole of the transmit/receive switch could be used to select one or the other of two preset potentiometers of the solder-in type arranged at the input to the first OC71.

Since the OC72 modulator draws 10 mA, it is by far the biggest individual consumer of battery power. Some experiments have been carried out with a form of amplifier known as sliding-

bias class A. In this type of amplifier the forward bias on a transistor is arranged to increase with the signal to increase the current flow through the transistor. Some economy of power consumption is achieved at the price of more complication and higher distortion. This system has not been adopted in the present unit.

## MECHANICAL CONSTRUCTION

For the actual wiring assembly, use is made of material known as Vero Board. This material comprises a phenolic board about 1-16 in. in thickness upon one side of which are parallel strips of copper each 3-32 in. wide and spaced apart by 3-32 in. Every 3-16 in. along the copper strips a hole is pierced through both copper and phenolic board. This material is a do-it-yourself printed wiring substitute. I used a piece of board 5 in. by 2 1/2 in. with the copper strips running horizontally across the smaller dimension. To use, proceed as follows:

Let the 'top' strip be an earth strip or rail. Allocate the next strip down the board to be a main h.t. or supply

copper strips are. This keeps them away from most of the components which are on the upper side of the board.

The case has the dimensions 7 1/4" by 3" wide and 2 1/4" deep. This is larger than necessary but gives adequate room for all components without cramping. The corners are made from material in the Widney Dorlec range of constructional material. This material comprises an aluminum alloy rod 13-32" in diameter with two longitudinal slots at 90°. These slots are of a width to accept 20 gauge aluminum sheet as a sliding fit.

The two sides and the two ends of the case have at each end of their lengths a portion which fits in the slots of the rods. Each side-piece and each end-piece of the case has a 1/4" fold-over top and bottom. The top and bottom panels are held in position by P.K. screws into the fold-overs. These P.K. screws hold the whole assembly together.

When the top and bottom panels are removed it is possible to withdraw the corner rods if desired. The catalogue



rail. The next strip will be decoupled h.t., the next the collector rail, the next the base rail, the next the emitter rail, and the next a further earth rail. The pattern will then repeat. A length of copper strip on each rail including four or five holes will suffice for wiring each stage.

The copper strip is severed between the next two holes with a sharp knife on all rails except earth and main h.t. rails. This technique allows more than one stage to be built across the width of the board. There is no point in breaking up the earth and h.t. rails.

As the pattern is repeated down the board all earth rails should be jumpered together and bonded to the case. The latter may be accomplished by using long 1/4" screws passing through enlarged holes in the earth rails and metal spacers for mounting the phenolic board on one of the panels of the

Components such as the trimmer capacitors and the crystal socket may be mounted on the board with a little ingenuity. All coils are under the board, that is on the side where the

number of the rod is DL222 in the Midget range.

The all-up weight of the unit, including battery, is 1 1/2 lb.

## MISCELLANEOUS

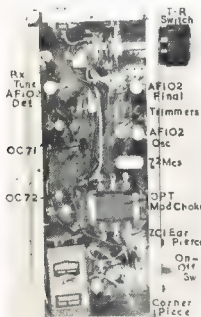
The transmit/receive switch requires a four-pole two-position switch. I used a six-pole two-position wafer switch of Japanese manufacture, two poles being spare. One pole is used for aerial changeover from the receiver to the transmitter. A second pole removes h.t. from the super regenerative detector and applies h.t. to the crystal oscillator. A third pole couples the h.t. feed point of the final to the collector of the OC72 on transmit. A fourth pole disconnects the ZC1 earpiece from the secondary of the OC72 output transformer, allowing the latter to function as a modulation choke, and connects the earpiece to the base of the first OC71 via an isolating capacitor.

Since the impedance of a ZC1 earpiece is nominally 60 ohms, no input transformer is required to match it to

the base of the OC71 in order to achieve a good level of modulation. The output transformer originally used a push-pull OC72 to 3 ohm voice coil type with only one half of the primary used. This gave a bad mismatch on receive and the transformer was subsequently dismantled and rewound with a turns ratio of about 3 to 1. This gives an impedance ratio of 9 to 1 and therefore the ZC1 earpiece should present a transformed impedance of around 500 to 800 ohms at the collector of the OC72.

An alternative solution to rewinding a transformer would be to use a standard OC72 to voice coil transformer, a midget 3 ohm speaker instead of the ZC1 earpiece, and a further transformer to step up the impedance of the speaker when serving as a microphone to match it to the base of the first OC71.

The power source is the standard 9 volt transistor battery type 216. With a current drain of 15 mA. on receive and 23 mA. on transmit, these batteries do not last very long.



For the serial a Japanese replacement whip is used which extends to a little more than the desired quarter wavelength of 19". A simple slide switch is used for on/off. The OC72 output transformer used has a core cross section of  $\frac{1}{2}$ " by  $5\frac{1}{2}$ " with a winding length of  $\frac{1}{8}$ ". In its rewind form there are 375 turns on the primary and 120 turns on the secondary of 32 s.w.g. enamelled wire.

The tuning capacitors are Philips tubular trimmers with ceramic insulation. The electrolytic capacitors may be 12.5 volt or 16 volt working. The paper and ceramic capacitors may be low voltage types.

**Construction Hints.** Do not overheat any of the components, particularly the transistors when soldering them in

position. Soldering to the Vero Board is easy with a clean hot iron.

One tip for working on transistor equipment. When soldering, always have the piece of gear isolated from earth wires or leads such as those from test equipment, since small leakage currents flowing from or to your soldering iron through a transistor can ruin it as you solder it in position.

Beware of injecting too much energy into transistor circuits from a closely coupled grid dip oscillator. Tuned circuits with transistors connected often exhibit poor dips when checked with a g.d.o. This is because the transistors are not "dead" like cold valves and conduct on the potentials induced from the g.d.o. The poor dips encourage tight coupling, sometimes with unfortunate results.

#### ADJUSTMENT

Adjustment of the receiver to the desired part of the band is simple and obvious. If super regeneration is not readily achieved, a little judicious fiddling with valves may be required as suggested earlier. Perhaps another transistor could be tried.

The transmitter adjustment on my unit was done by listening for the second harmonic of the crystal oscillator on a 144 Mcs. receiver and adjusting the two trimmers in the oscillator for

## 8236 POWER PENTODE FOR S.S.B. TRANSCEIVERS

The demand for a higher power output replacement for the 6DQ5 is catered for by the 8236. For initial equipment, however, the Mullard preferred range of s.s.b. valves is recommended. Readers are referred to the table in Outlook, Vol. 5, No. 5, page 52, which shows the Mullard range of s.s.b. valves and to which the YLI150 is the latest addition.

Comprehensive technical information on s.s.b. transmitting valves may be found in Volume 3 of the Mullard Technical Handbook.

The 8236 is a high pervance, high dissipation, beam power valve which is rated and tested for use as an r.f. power amplifier. It may also be used as a series regulator and as a general purpose power valve. In most cases the 8236 will function as a high dissipation, direct plug-in replacement for the 6DQ5. In r.f. service up to 30 Mcs. the 8236 will handle 200 w. input and deliver 141 w. to the load. Because of its high pervance design, these conditions can be obtained at the relatively low anode voltage of 900 V. Its carbon anode and hard glass envelope permit continuous operation at 50 w. anode dissipation.

The 8236 is available from stock and tentative data are given below:—

#### TENTATIVE DATA 8236 POWER PENTODE

(Linear r.f. power amplifier in Class "AB1" s.s.b. Service with suppressed carrier.)

**Maximum Ratings:** Absolute maximum system for frequencies up to 30 Mcs.:

Anode voltage .... 1400 V DC  
Grid No. 2 voltage ... 250 V DC

good output as seen on the receiver "S" meter or magic eye, and consistent starting of the oscillator. The final was peaked up with the whip extended, also by the use of a receiver equipped with a signal strength indicator.

#### COIL DATA

L1—1 turn, 7-16" diam.  
L2—2½ turns, 7-16" diam.  
L3—2 turns, 7-16" diam.  
L4—3 turns, 7-16" diam.  
L5—2 turns, 7-16" diam.  
L6—7 turns, 7-16" diam.  
All coils are air wound with 22 s.w.g. RFLC—30 turns to fill ½ watt resistor.  
CHI—18 turns to fill ½ watt resistor.  
Prune to resonate with crystal holder at 74 Mcs.

#### RESULTS

The performance has exceeded expectations. Best two-way contact using the whip aerial was from the Port Hills, Christchurch, to Asbburton—a distance of approximately 50 miles. The signal report from Barry ZL8AR was readability 5 and strength 4. I have a QSL for the contact to show unbelieve.

#### REFERENCES

"QST," February 1960, page 20.  
"QST," June 1961, page 42.  
"QST," March 1964, page 37.  
"Electronics World," November 1963, page 39.  
"Wireless World," May 1963, page 341.

Grid No. 1 voltage ...	—150 V	DC
Anode current ...	300 mA	DC*
Anode dissipation ...	60 W	
Grid No. 2 dissipation ...	3.2 W	
Bulb temperature ...	250 °C	
Maximum Grid No. 1 circuit resistance ...	30 kΩ	

#### Typical operation with two-tone modulation:

Frequency ...	30 Mcs.	
Anode voltage ...	1000 V	DC
Grid No. 2 voltage ...	180 V	DC
Grid No. 1 voltage ...	—66 V	DC
Zero signal anode current ...	25 mA	DC
Zero signal Grid No. 2 current ...	1.0 mA	DC
Effective r.f. load resistance ...	2.8 kΩ	
Maximum signal peak r.f. grid voltage ...	66 V	
Anode current ...	170 mA	DC*
Average anode current ...	118 mA	DC
Grid No. 2 current ...	5.0 mA	DC*
Average Grid No. 2 current ...	2.5 mA	DC
Average Grid No. 1 current ...	0.01 mA	DC
Power Output ...	115 W*	
Average Power output	57.5 W	
3rd Order Intermodulation Products ...	—25 db	
5th Order Intermodulation Products ...	—33 db	

\* At peak of envelope.  
\* Preferably obtained from a well-regulated source.  
\* Preferably obtained from a separate, well-regulated source.  
The peak signal voltage should be equal to the D.C. grid voltage.  
\* This value is the approximate grid No. 1 current due to initial electron velocity effects when the grid is driven to zero volts at maximum signal.  
\* Referenced to either of the two tones and without the use of feedback to improve linearity.

## NEW CALL SIGNS

JULY, 1965

VK3FV R. M. Marsden, Station: 11 Trafalgar Road, Turras Heads, Postal: 43 Houston Road, Kingsford.  
VK3FT M. D. Legg, 144 Kendal Street, Cowra.  
VK3WP W. H. Jones, 51 Canonbury Grove West, Bexley North.  
VK3ADJ E. W. Jinks, 1 South Street, Broken Hill.  
VK3AFI P. E. Stayte, 3/71 Evaline Street, Camper.  
VK3ARC D. CHAT, Flat 1, The Swifts, 65 Bower Street, Manly.  
VK3APG F. W. Fowler, Station: 23 West Street, Fivedock, Postal: P.O. Box 50, Beckfield Hill.  
VK3ZAF J. L. Harrison, 20 Bishop Avenue, West Pennant Hills.  
VK3ZGW G. L. S. Wilson, 31 Ada Street, Katumba.  
VK3ZHE R. G. Friend, 7/23 Beauchamp Street, Marrickville.

VK3ZJP P. J. Fackender, Kanahooks Road, Depto.  
VK3ZK J. T. Kalopedis, 24 Walton Street, Blakehurst.  
VK3ZQM G. V. Comber, Station: 94 Onslow Street, Kings Bay, Postal: Yellow Cabs Co., Dartington.  
VK3ZQT A. F. Butler, 127 Manchester Road, Gymea.  
VK3ZTE R. A. Adams, 37 Bardwell Road, Bardwell Park.  
VK3ZUB B. Unsworth, Wyee State Mines, C/o P.O., Doyalson.  
VK3ZTC Sydney Teachers' College Radio Club, Sydney University Grounds, Newtown.  
VK3ZTD T. D. Downie, 28 Broad Street, Croydon Park.  
VK3DA A. Davis, 10 Hovea Street, O'Connor, A.C.T.  
VK3VB V. P. Burman, 10 Dawson Street, Cuthbert, A.C.T.  
VK3AB D. G. Hallam, C/o O.T.C. Radio Station, Fiskville, via Ballan.  
VK3AEJ G. W. Brain, Federal Street, Rainbow.  
VK3AZH K. J. Horsfall, 75 North Road, Reservoir.  
VK3AZN Z. H. Vandervelen, 43 Clow Street, Flat 4, Dandenong.  
VK3ZT R. L. Head, Box 55, Mundara, Seymour.  
VK3ZIV H. C. Allen, 21 Leonard Street, Heidelberg.  
VK3ZK D. W. Mew, Bamawm, via Rochester.  
VK3ZOZ D. L. Godfrey, 10 Alexandra Avenue, Moa.  
VK3ZPX R. K. N. Wilkins, 118 Mount Albert Road, Cheltenham, E.7.  
VK3ZQB C. Baxter, "Hildathorpe," Clarke Road, Pearcevale.  
VK3ZRE J. L. Gardiner, 10 Lingwell Road, East Heathorn.  
VK3ZTH J. T. Elgson, 24 Stapley Crescent, Chadstone.  
VK3ZVV R. F. Finner, 8 Chestnut Street, Carnegie.  
VK3AJ A. E. W. Williams, Flat 3, 29 Gregory Street, Clayfield.

VK4DV M. T. Deskin, 17 Nelson Street, Wulguru, Townsville.  
VK4LS J. A. Simpson, 414 Wynnum Road, Wynnum.  
VK4NP N. F. Wilson, 111 Richmond Street, Gordon Park.  
VK4OG R. E. Gunnourie, 64 Gregory Street, Toowoomba.  
VK4VY G. H. Crozier, 48 Algoroi Street, Mornington.  
VK4ZWM W. McGowan, 68 Alderson Street, Newmarket.  
VK5L R. G. Bell, 8 Flower Street, Elizabeth Downs.  
VK5LJ J. R. Godson, Station: Block No. 4 Kroen's Landing, Walkers Flat, Postal: 334 May Terrace, Ottway.  
VK5XP R. A. Ford, 27 Dommington Road, Elizabeth North.  
VK5ZPD P. L. A. Burian, 85 North Terrace, College Park.  
VK5ZQB R. Dittloff, 12 Essex Avenue, Clovelly Park.  
VK5EP D. J. Fennell, 72 Hare Street, Kalgoolie.  
VK5XY A. M. Keightley, Johnston Street, Wickepin.  
VK5ZDR R. C. Speer, Station: Warburton Road, Bridgetown, Postal: P.O. Box 71, Bridgetown.  
VK5ZEX M. G. Shooter, C/o Agricultural High School, Narragin.  
VK5ZFD J. C. Goulet, 45 Powell Street, Jondahana.  
VK7FB F. A. C. Richards, 170 Westbury Road, Leunceston.  
VK7ZMC M. C. Hooper, 183 Melville Street, Hobart.  
VK9JO J. P. O'Toole, C/o O.T.C. Cable Sta., Cocos (Keeling) Is.

## ROSS HULL MEMORIAL TROPHY V.H.F. CONTEST

from 12th Dec., 1965, to 16th Jan., 1966  
All v.h.f. operators are invited to participate.

## LOW DRIFT CRYSTALS

FOR

## AMATEUR BANDS

ACCURACY 0.01% OF  
STATED FREQUENCY

3.5 and 7 Mc.  
Unmounted, £2/10/0  
Mounted, £3/0/0

12.5 and 14 Mc.  
Fundamental Crystals,  
"Low Drift"  
Mounted only, £5.

THESE PRICES DO NOT  
INCLUDE SALES TAX

Spot Frequency Crystals  
Prices on Application.

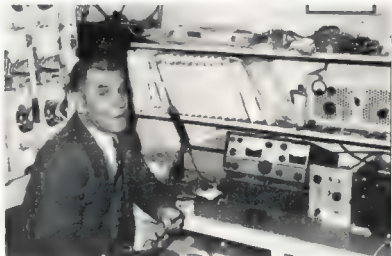
Regrinds .... £1/10/0

## MAXWELL HOWDEN

15 CLAREMONT CRES.,  
CANTERBURY, E.7,  
VICTORIA

## SIDEBAND SKETCHES

DUDLEY NOURSE, VK2DQ



On obtaining the graven image of "The Voice of the Remnants of Democracy," alias VK3 Delightful Quality of Broken Hill, it was considered appropriate to commence this series.  
As a pre-war exponent of the "pump-handle" method of communication, which he continued for the R.A.A.F. for some years (note that the said handle is still visible in the photograph), Dudley's tracks were traversed by a quacking duck over 10 years ago, when he became a foundation member of the 80 metre "Sewing Circle," still apparent at the top end of the band.

Although a keen do it yourself man, Dudley has put aside phasing networks, mechanicals and McCoys, and emptied the shack "kinger jar" in buy a Swan, which gives him time on the air minus a breath to experiment with his Deitabet.

The 2DQ log records details of experiments, conversations and data, all in shorthand—quite the most comprehensive in VK. I should imagine.

Dud. was behind the scenes for the May, 1964, Sidebanders' Convention at Hamilton,

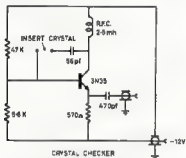
# A TRANSISTOR CRYSTAL CHECKER

T. MITCHELL,\* VK5TH

**T**HE Crystal Checker illustrated was intended as a go/no-go and frequency measuring device and was not designed to be used as an activity tester. Oscillation can quickly be checked by feeding into a c.r.o. with a reasonable high frequency Y amp. response. Output is sufficient to trigger a Hewlett Packard frequency counter.

The device is an invaluable aid for crystal grinding. The crystal plug-in connections on the tube bases are arranged so that almost any crystal will plug in-circuit in any orientation. The extra capacity introduced should not affect accuracy for practical Amateur applications.

The battery pack consists of nine nickel-cadmium 50 m/AH. cells inserted in a patent drug phial with a B. & C. co-axial connector. These cells are available at about six shillings each and if charged carefully should last some years.



The transistor, a 3N35, is a v.h.f. tetrode (silicon NPN) extracted from disposals equipment and used as a triode in a Pierce type circuit. Simple "rule of thumb" calculations suggested by the Mullard "Reference Manual of Transistor Circuits" resulted in a collector current of 1 mA. Output from the emitter into a high impedance c.r.o. varies from 100 to 500 millivolts, depending on crystal activity and c.r.o. Y amp. frequency response.

The circuit is not the ultimate in design but a practical arrangement requiring minimum components. Note the absence of a tuned circuit.

I have used this circuit with various transistors in two Amateur band converters and a 1 Mc. oscillator for a projected Deltahe type receiver. No trouble has been experienced with harmonic or unwanted oscillations, although I concede their presence is likely.

\* 11 Station Place, Alberton, South Aus.

Although no meter is yet incorporated, the following figures are submitted. A 0-500  $\mu$ A. meter was inserted directly in the base of the transistor. The no-signal base current was 15  $\mu$ A.

Crystal freq. Kc.	Base Current $\mu$ A.	Type of Crystal
22,000	170	Miniature sealed can
15,407	120	Vacuum Sealed
8,902	280	
8,646	255	
8,327	240	
8,327	240	
8,327	240	
7,408	240	
7,408	240	
7,408	240	
8,332	240	
8,332	100	DC11
8,332	80	
7,610	240	
7,610	230	
2,853	40	
2,460	80	

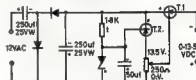


I would suggest that the best approach for anyone wishing to build a similar checker for use as an activity tester would be to use any low power transistor classified as v.h.f. and incorporate a meter. Noting the tendency of base current to rise with frequency, calibrate against a commercial crystal activity tester using vacuum sealed crystals as standards.

## An Economical Transistor Power Supply

This very useful little power supply was built in about an hour to run a transistorised transmitter (on 2 mx f.m.) that was rather expensive to run on dry cells. Cost of components as purchased is about four or five sets of batteries. Since then it has also been used for running transistor radios and similar gear, testing power transistors and charging NiFe cells.

The circuit uses a half-wave voltage doubler followed by a conventional transistorised voltage regulator (with zener diode voltage reference) plus capacitance multiplier. A portion of this output voltage controls the second OC74, giving zero up to the zener voltage output, fully variable.



\* Red spot on case.  
† Adjust to maximum allowable zener current.  
‡ Diodes OC74 or any diodes with forward current of 500 mA., and peak inverse voltage of 50 volt or more.  
§ Zener Diode: Nominal 135 volt or as required.  
|| Transistor: T1, OC74 on at least 12.5 sq. cm. of heat sink.  
¶ T3, OC74.

As the emphasis was on simplicity, no overload protection was fitted. However, the regulation of the voltage doubler is so poor that at about 220 mA. output current there is insufficient voltage to maintain the zener action, regulation is lost and the output voltage drops sharply. Short-circuit current is less than 500 mA., which the OC74 presently in use has withstood on many occasions. But take note: this is considerably beyond its ratings of 310 mA., so keep a spare handy if you are careless. Also, if you can't afford numerous spares, don't take more than 50 mA. at less than 9 volts output voltage.

### PERFORMANCE

Voltage range: 0-13.5 volt continuous.  
Maximum output current: 200 mA. at 13.5 volt; 50 mA. at 6 volt.  
Hum: 0.02% at 50 mA.  
0.05% at 200 mA.  
Regulation: -2% at 200 mA.

—D. M. Bennett, VK3ZRX.

**CHOOSE THE BEST—IT COSTS NO MORE**



G. E. LEMPHERE & CO. LIMITED, Head Office: 27-41 Brandon Street, Alexandria, N.S.W.  
and 10 Melbourne, Brisbane, Adelaide, Perth

Phone 34-6539, write or call  
**WILLIS** & Co Pty. Ltd.  
428 Elizabeth St., Melbourne  
for **GELOSO**  
Equipment and Components

# SIDEBAND ELECTRONICS ENGINEERING

P.O. BOX 23, SPRINGWOOD, N.S.W.

Phone 51-1394

**PRICES ARE INCREASING EVERYWHERE, BUT NOT HERE. ON THE CONTRARY—**

- ★ For £300 you can still buy our 5-band **Galaxy** and **Swan Transceivers** with heavy duty 240v. a.c. supply/speaker combination in matching cabinet and expect after-sale service plus a valuable bonus accessory with all sales through the Christmas period.
- ★ Our 12v. d.c.-d.c. **Mobile Power Supplies** range from £45 to £60—all have full-wave bridge rectification, built-in overload protection and naturally are fully guaranteed.
- ★ **Turner Ceramic P.t.t. Microphones**, £5; desk model, £10.
- ★ Still available, the **Autronic Automatic Keyer**, fully transistorised with built-in monitor and power supply, at the equivalent of the U.S. dollar price plus S.T., £35 net.
- ★ Next in line, expected soon, a range of **Hy-Gain Antenna** products, 3-band Yagis and 4-band Ground Planes, special mobile whip bases. Also Ham-M C.D. Rotators which will safely handle the largest beams, also lighter **Alliance Rotators**, safe for smaller beams and quads. Prices will be very attractive!
- ★ 5-position B. & W. **Co-axial Antenna Switches**, £6/10/0; a good duplicate of same with Amphenol connectors, £4/10/0; PL259 and SO239 Connectors at half the price elsewhere.
- ★ Still available, **Crystal Filters** and 8 and 9 Mc. **Crystals**, Jackson Bros. **Vernier Dials** and assemblies —a Swan SW350, also ceramic air-trimmers with extension shafts for the home builders.
- ★ **Used equipment**: Swan SW120, 20 mx full coverage Transceiver, £90. Hallicrafters HT-37 10-80 mx Transmitter, £185.

**Just Out!**

**The NEW..COMPLETE..ALL-IN-ONE!**



## STOCK TRANSFORMER CATALOGUE

New  
New  
New

SOLDERING IRON TRANSFORMERS  
FILAMENT AND GENERAL PURPOSE  
POWER TRANSFORMERS  
Comprehensive Range of:  
POWER TRANSFORMERS AND CHOKES  
HI-FI OUTPUT, SPEAKER AND  
TRANSISTOR TRANSFORMERS

**FREE** at your A & R Stockist!

To A & R TRANSFORMERS PTY. LTD.,  
P.O. Box 170 Box Hill, Victoria

Name.....  
Address.....  
State.....

FREE  
CATALOGUE  
COUPON  
1965

**OR POST THIS COUPON** →



# Book Review

## AMATEUR RADIO CIRCUITS BOOK (R.S.G.B.).

As the title suggests, this is a book of circuits suitable for Amateur Radio constructors. A wide field of valves and semi-conductor applications is covered, but no text or descriptions accompany the circuits. Some are complete units, but most are of single stages.

Topics covered include antenna couplers, h.f. pre-amplifiers and converters, v.h.f. pre-amplifiers and converters, i.f. filters, mechanical filters, Q multipliers, product detectors, f.m. detectors, noise limiters, audio a.g.c., audio amplifiers and compressors, modulators, electronic keyers, T.R. switches, v.o.x., balanced modulators, mixers, linear amplifiers, power supplies, crystal oscillators, v.f.o.s, v.x.o., marker oscillators, test equipment, h.f. and v.h.f. reflectometers, and transistor transmitters. The circuits are printed on excellent paper and the book is spiral bound.

This book should become a standard reference in every Ham shack.

## S.S.B. EQUIPMENT

(Reprinted from the R.S.G.B. Bulletin.)

In this booklet G2DAF has described his Mark 2 transmitter and power supply, and his linear amplifier. His design is complex and he has definite ideas on the approach to a s.s.b. transmitter.

The unit described uses the filter method of sideband suppression, and has been designed so that either a low frequency crystal filter or mechanical filter, or a high frequency crystal filter, may be used.

Information is given for the construction and alignment of the crystal filters, and the reasons given for the choice of the various conversion frequencies.

Some may not agree with the author on his particular approach to a s.s.b. transmitter, but the booklet will be interesting reading for all interested in s.s.b., and particularly for those contemplating construction of a transmitter.

## RADIO AND TELEVISION RECEIVER CIRCUIT AND OPERATION (Revised Edition).

Alfred A. Ghirardi and Jean E. Dines.

At the present time there are no really good textbooks covering t.v. servicing available in Australia. Most of those that are available are obsolete. Therefore, despite the fact that American t.v. operates on different channel frequencies, band width and scanning frequencies, this book should be welcomed by students and servicemen alike.

Compiled by the well-known American t.v. and radio authorities, Ghirardi and Dines, this edition has been completely re-written to take advantage of the many technical advances made since publication of the original edition. Written in an easy to follow style, with the text amply illustrated with graphs and diagrams, the book commences with basic communication theory and comprehensively covers modern radio and television, a.m. and f.m. receivers, the design and structure of basic receiver components, larger television tubes, colour television, high efficiency tuners, and transistors. To assist the student, each section ends with a set of review questions.

The chapters dealing with u.h.f. tuners, and colour television, may not be of immediate interest, but the section dealing with transistorised t.v. receivers is excellent and the book is almost worth buying for this section alone. The binding, paper and printing are of the highest quality and the Australian price of £5/5/6 for this 556-page book seems very reasonable.

Rigby Ltd., of Adelaide, are the sole Australian and New Zealand distributors and supplied the book for review.

## COMMUNICATION RECEIVERS (R.S.G.B.)

This fine booklet produced for the R.S.G.B. by G2DAF must surely be one of the most comprehensive descriptions of circuitry suitable for a modern communications receiver yet published. The author is obviously an expert in this field and even though he has definite ideas or preferred circuits, he gives excellent arguments for his choice. The standards set for the finished receiver are equal to the highest priced commercial units, but the theory and construction portions of the booklet make no reference to transistors. This has apparently been brought about by a desire to use disposals parts and keep the cost down to a minimum.

An idea of the completeness of the booklet, which describes the preferred circuits for each stage of a receiver, is given by the attention paid to Miller effect in the i.f. amplifiers, and details of how to obtain linear calibration of the v.f.o. The third section of the booklet deals with a crystal locked converter for those who wish to use an existing receiver as the tuneable i.f.

In all, the booklet is a must for all those contemplating building, or modifying, a unit for use as a modern Amateur receiver.

## MATHS. FOR THOSE THAT HATE IT Roy Hartkopf

Although this book does not deal with radio, it should be good reading for most Amateurs—and not only because the author is a Melbourne Amateur. Mathematics is an essential part of radio, and for those of us who struggle every time we encounter a problem this book could be the answer. It does not set out to teach mathematics in the ordinary sense, but rather to give the ordinary person a basic understanding, in simple language, of some of the practical aspects of mathematics, and the use—or misuse—

At first I was not overjoyed at the thought of reading a book about mathematics, but after perusing the first chapter my natural aversion to mathematics was overcome to the point of avidly reading the whole book. Nothing in mathematics is sacred to Mr. Hartkopf, and he takes delight in exploding conceptions held by most laymen about the subject. As well, he writes in an extremely humorous and direct style, which is easy to read. For example, the first page includes "The statement that one plus one is two might seem at first sight a perfect example of a universal and at the same time absolutely accurate truth. Actually it is neither. When we get down to real objects we often find it is impossible to add them together at all. One cow plus one bale of hay might make a contented cow. It might even eventually add up to a couple of gallons of milk but it certainly doesn't add up to two cow-bales."

Commencing with a chapter entitled "One plus one is Nothing," the book progresses through, amongst other things, lunar counting, logarithms, graphs, trigonometry and calculus with the complex points brought down to earth and explained, often humorously, so that anyone can understand.

This hard-covered book of 250 pages is published by Rigby of Adelaide and sells for 37/6.

## JOYSTICK

### VARIABLE FREQUENCY ANTENNA 1.5-30 Mc.

The world's most versatile and compact h.f. band antenna for transmission and reception. More than 1,000 stations throughout the world are equipped with the Joystick system. Testimonials pour in, takes a lifetime and favours the JX. Overall length 7 feet 4 inches. The complete system listed below comprises de luxe or standard Joystick (as indicated) plus Joystick Tuners and everything else required apart from existing transmitter and/or receiver.

#### WHOLE PRICE

Complete De Luxe Joystick Transmitting System (including tuner for transmit and tuner for receive)	£21/9/6 (\$42.95)
Same as above, but Standard Joystick	£18/17/6 (\$37.75)
Complete De Luxe Joystick Receiving System (including tuner for receive)	£17/18/6 (\$35.80)
Same as above, but Standard Joystick	£15/6/6 (\$30.60)
Complete Joystick Mobile System (including tuner for tx and rx plus mobile mounting)	£18/19/6 (\$37.90)
RF40 Field Strength Meter, magnetic base, 1-250 Mc. in five switched bands	£6/19/6 (\$13.95)
Mobile Mounting Kit (converts existing Joystick for mobile mounting)	£3/13/6 (\$7.30)

Send for descriptive literature and testimonials, including the outstanding performance of the Joystick used by ZL4GA W.A.C. in one day under very poor conditions, etc. WJSLQG is amazed with the performance of the Joystick, so is WJSLQG.

## PENNANT IMPORTS (ELECTRONICS) CO.

14A THORN STREET, PENNANT HILLS, N.S.W.

MAIL ORDERS: P.O. BOX 177, ASHFELD, N.S.W.

# Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

## ACKNOWLEDGMENT

Editor "A.R." Dear Sir,

With respect to the Technical Correspondence published in the October issue of "A.R." with regards to my Low Noise Two Metre Converter article in September issue, I overlooked, in my haste to achieve the publisher's deadline, the acknowledgment to Jeff Vale VK2KZP for supplying the relevant technical details enclosed in the letter. For the purpose of completeness I hereby submit an acknowledgment to Jeff for his assistance on the explanation.

—C. J. Hurst, VK2KZU.

## COST OF OVERSEAS EQUIPMENT

Editor "A.R." Dear Sir,

This is in reply to the letter by C. Whalley, VK6KK, in regard to the "Cost of Overseas Equipment."

If the retail export price of the Transceiver in question is about £210, and if the importer receives a 20 per cent. discount, his cost will be about £168. Sales tax plus duty on these items comes to 46.5 per cent., therefore total cost will be about £286. Allow, say £8 for post. He sells the item here for £390, not including sales tax. That comes to about 38 per cent. profit. This is not excessive.

Consider another example. Our Exposure Meters, which are convertible to high sensitivity microammeters, cost £10 retail in U.S.A. We get 10 per cent. discount. Cost is therefore £12. Sales tax plus duty is 53 per cent., therefore delivered cost is 18.5, 20 per cent. of them, however, are defective, raising the price effectively to 23.5. Postage added about 8 per cent. We sell them for 30/6 or 31/6, depending on inherent sensitivity; about 80 per

cent. of each. This comes to an average profit of about 34.5 per cent. This is not excessive.

From this profit we have to pay a secretary and technician, and the manager is fortunate to get something left over, which he promptly puts back into new stock, because of the enormous capital investment necessary in any expanding enterprise.

Mr Whalley must realise that "Overhead" is not a term invented by greedy capitalists, but comprises a considerable part of the cost of business activity. We used to share reservations similar to those expressed by Mr. Whalley, but this business quickly educated them out of us. Importing can be a hazardous and difficult activity, and most importers well and truly earn the profit they obtain. Private individuals who have tried it for themselves have often been quick to agree with this opinion.

—R. L. Gunther, Manager, Electronics As-

Editor "A.R." Dear Sir,

Your correspondent Mr. C. Whalley, VK6KK, in his letter published in the October issue has directed my attention to my company and has criticised importers like ourselves for making excessive charges in importing equipments, thus greatly magnifying the cost in overseas countries when compared to Australian selling prices.

I have been involved in importing Eddystone receivers since about 1935 as the Australian agent for Stratton and Co. Ltd., makers of these receivers. I have also been hamming it since 1938. Therefore I can speak with some degree of authority both as a Ham as well as an importer.

As VK6KK states, there is a great deal of mystery surrounding the importation of overseas equipments. To be really understood, one must be directly connected with the problem as my company is. Mr. Whalley has overlooked, for instance, the fact that customs duty must be paid on all imported goods when making out his financial sum of charges.

In answering this letter I feel that I would serve a universal purpose if I quoted a typical calculation as to what it would cost an Ama-

teur if he were to write over to say Webbs Radio in London and order an Eddystone KC-10 transistorised communications receiver to be shipped to Australia and deliver. Sales, or purchase tax, does not come into this consideration please note.

Amateur net price in U.K. (no sales tax)	£48 0 0
Packing case, say	1 0 0
Bill of lading, export formalities, etc.	3 0 0
Sea freight to Australia including insurance	4 4 0

£56 4 0
Add exchange to convert to Aust. currency 25 1/2 %
£69 10 8

Customs duty.	
Flat charge per receiver, £3	£5 0 0
Plus 37 1/2 % on £48 sterling	£18 11 5
	£69 11 5

Clearing through Customs agent (raising of Customs entry), wharfage charges, delivery to QTH, etc., say	£ 0 0
	£69 11 5

N.B.—R. H. Cunningham Pty. Ltd. selling price to Amateurs	£69 10 8
---	----------

Importers usually depend on a commission or discount to make their margin upon which to operate the business. I must explain, however, that Eddystone receivers are sold direct to the end user and additional profit margins are not provided for further handling houses. The policy of this company therefore does not necessarily conform to that of other organisations.

In addition to the service my company renders fellow Hams in bringing overseas equipments into Australia we also provide pre and after sales testing and service. A direct buyer must carry these functions himself of course.

I trust this explanation helps to clear up the "inexplicable mystery" as Mr. Whalley calls it.

—R. H. Cunningham, Managing Director, R. H. Cunningham Pty. Ltd.

## BRIGHT STAR CRYSTALS

### FOR ACCURACY, STABILITY, ACTIVITY AND OUTPUT

Our Crystals cover all types and frequencies in common use and include overtone, plated and vacuum mounted. Holders include the following. DC11, FT243, HC-8U, CRA, B7G, Octal, HC-18U:

THE FOLLOWING FISHING-BOAT FREQUENCIES ARE AVAILABLE IN FT243 HOLDERS:—

6280, 4095, 4535, 2760, 2524 Kc.

5.500 Kc. T.V. Sweep Generator Crystals, 23/12/6 100 Kc. and 1000 Kc. Frequency Standard, 28/10/6 plus 12 1/2 % Sales Tax.

Immediate delivery on all above types.

AUDIO AND ULTRASONIC CRYSTALS—Prices on application. 455 Kc. Filter Crystals, vacuum mounted, £6/10/0 each plus 12 1/2 % Sales Tax. ALSO AMATEUR TYPE CRYSTALS—3.5 AND 7 Mc. BAND.

Commercial—0.02% £3/12/6, 0.01% £13/5/0, plus 12 1/2 % Sales Tax.

Amateur—from £3.12/6, plus 12 1/2 % Sales Tax.

Reprints—Amateur £1/10/0, Commercial £1/17/6.

CRYSTALS FOR TAXI AND BUSH FIRE SETS ALSO AVAILABLE.

We would be happy to advise and quote you.

New Zealand Representatives: Messrs. Carrel & Carrel, Box 2102, Auckland. Contractors to Federal and State Government Departments.

## BRIGHT STAR RADIO

46 Eastgate Street, Oakleigh, S.E.12, Vic.

Phone: 57-6387

With the co-operation of our overseas associates our crystal manufacturing methods are the latest.



## FL-100B S.S.B. TRANSMITTERS

Completely Self Contained.

### FIVE BANDS

Built-in Ant. Relay, v.f.o., a.l.c., p.t.t., anti-trip vox, s.s.b., a.m., c.w.

Selectable Sidebands.

Ideal also for h.k.-in.c.w.

### MECHANICAL FILTER

6DG5 p.a., 120w. p.e.p., 230v. and 110v. a.c. operation, all plugs, inst. manual and p.b. microphone included.

### NOTHING ELSE TO BUY

Testimonial! FL-100B's are in use in all VK States and gaining world-wide popularity, e.g., Europe, Canada, Japan, etc. Chosen by Australia's leading phone DX station

NEW FR-100B S.S.B. A.M. C.W. RECEIVER AVAILABLE SOON

### BAIL RADIO & T.V. SERVICE

60 Shannon Street, Box 811, Melbourne, Vic.

Phone: 89-3213.



# SIDE BAND

By Phil Williams VK3NN

## AUDIO PHASE SHIFT NETWORKS

For phasing exciter one of the most critical assemblies is the audio phase shift network, usually a resistance-capacitance network giving two outputs of equal amplitude 90 degrees phase shifted with respect to each other, over a frequency range of 10 to 1. For speech frequencies the hand covered is approximately 300 c.p.s. to 3000 c.p.s. with a maximum error of plus or minus 1 degree. Some networks have been developed which will provide this standard over a much wider range, a typical example of which is the "Domes" network which works with a 50 to 5000 cycle range, which is good enough for medium quality music or "entertainment" transmission. Sometimes "band-splitting" has been used with two of the 191 frequency range networks, using say 80 to 800 cycles on one network and 850 to 8000 on another, recombining the two bands to provide 50 to 8000 c.p.s. channel. It may be argued that this may be done much more readily with filters, but the filter solution is not as easy as it appears at first, since the phase changes which occur within the pass-band of narrow band-pass filters (particularly some mechanical filters) cause undesirable characteristics in the received signal, and even though amplitude distortion is minimised, the signal does not sound "natural" unless special attention is paid to this matter of phase distortion.

It has been possible to purchase suitable audio phase-shift networks locally, and these have generally proved satisfactory. I know of several Amateurs who have had the misfortune to import phasing networks, only to find, after months of poor reports, that a faulty network has been sealed up inside a metal envelope, and although this is not the usual experience, some information as to what to expect or how to check that the unit and associated circuitry are doing the job, may be of assistance to the Amateur trying to get his phasing exciter operating at its optimum.

Figure 1 shows the circuit diagram of the well-known Central Electronics type PSI network together with its "two-sevenths" input voltage divider, and the audio amplifier necessary to present equal, but quadrature-phased speech signals to the two balanced modulators (which are supplied also with the quadrature-phased radio-frequency signals as described last month).

Several months ago the audio filter, limiting speech to below 3000 c.p.s. and the audio amplifier with restricted base response below 300 c.p.s. were described in these notes, so you may now be getting a clearer mental picture of the overall requirements for design and construction of an acceptable phasing-type single sub-band transmitter.

If you use the 3 to 1 audio output transformer to drive through the filter to the "two-sevenths" relative divider, then only those frequencies which the phase shift network

can handle will be presented to it. This will eliminate the low frequency "crud" which is sometimes detectable in a phasing signal, and also the high frequency "whiskers" which "spit" over the other fellow's transmission on an adjacent channel.

There is nothing magical about the making of a good audio phase shift network. You will see that R1 and R2 are both 100K, and R3 and R4 100K. These do not have to be exactly these values as long as you can get two pairs of resistors within 1% of each other and in the ratio 4 to 1. R3 and R4 may be made from 100K plus 33K in series, so this presents no problem.

The condensers, again, do not have to be exactly the values stated as long as C1, C2, C3, C4 in the ratio 1:2:4:8. I have made quite good networks where the condensers were made up as follows:—

- C1 equals 500 p.p.f.
- C2 equals 1250 p.p.f. equals 3C1
- C3 equals 2500 p.p.f. equals 4C1
- C4 equals 5000 p.p.f. equals 8C1

The only effect of the increase in C is that the frequency range of the network dropped slightly, to approx. 370 to 2700 c.p.s. over which correct phasing was obtained. If you have a deep voice could be quite useful, but, on the other hand, an XFL operator could benefit by reducing the C, to about 500 p.p.f. and others in the same proportion. Another useful tip for building up these capacitors is to buy the largest size 1% capacitor you can get just below the value required, and build up to the value needed with say 5% capacitors; e.g., the 1250 condenser could be 1200 at 1% plus 50 at 5% plus 10 at 5%, which will give 1340 p.p.f., i.e., well within the tolerance required.

Networks made this way will not fit into a metal valve envelope, but may be assembled on a small piece of bakelite matrix board or resistor strip, to produce an acceptable item.

Passing now to the post-phasing amplifiers, it is usual to employ the two halves of a 12AT7 double triode with transformers to step down from the plate load impedance to 20,000 ohms to 200 ohms to feed the balanced modulators. There have been numerous complaints with these transformers due to the small gauge wire used on the primary, and some Amateurs have waited a long time for replacements. There are two solutions to this problem, both quite good. The first shown in Fig. 1 is to use transformers made from modified receiver output transformers. The best transformers are those not potted in pitch. I have used 1000 ohm/15 ohm speaker transformers. First, remove the bobbin from the core, and strip off the 15 ohm secondary winding, counting the turns as you remove them. Next, wind on another secondary of approx. 2% times the original. This gives a voltage step-down of about 0.1 or 0.1 to 1. Reassemble the core with no air gap, which is not needed since a 12AT7 draws only 4 or 4 milliamperes. There will be two identical transformers needed, of course.

Since the transformer will need to perform at above 300 cycles/sec. only, and the originals were made to work to below 100 cycles, the primary inductance of the unit with no air gap is adequate to give flat frequency response.

The second approach is to retain the post-phasing amplifiers without transformers for

balancing and gain, and, with resistive plate loads follow them with a 12AU6 or two cathode followers. The arrangement is shown in Fig. 1b.

Adjustment of the gains of the systems to be equal is easily carried out by shunting the two input grids together at X and X' and with a pair of earphones connected between the outputs P and P', vary the balance control R1 until minimum output is heard in the phones.

An overall check on the performance of the whole amplifier may be made with the two outputs connected to the X and Y amplifiers of an oscilloscope. With XK shorted, adjust the oscilloscope amplifiers to give a 45 degree slope straight line on the tube. A suitable signal source for these tests is a transistor radio at low volume about 6 inches from the microphone on the bench—select a male voice, e.g., reading the news, which should be akin to actual working conditions for your rig.

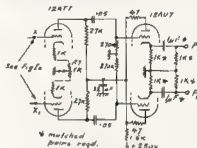


Fig. 1b—Post-phasing amplifier using cathode follower output.

On removing the short from XK, the pattern on the oscilloscope should bloom into something like the full-face view of a "camellia," on speech, or a full circle with a line wave input. A good test is to explore your normal loadings range and vary settings of the A.F. gain control (and clipper, if included). This will show you plainly if there is any distortion of timing. It is very easy and easy way to check a phasing exciter speech and phase shift unit at any time during its life after you suspect a fault or a flat tube. If you have access to an audio oscillator, a quick run through the 50 to 8000 cycles/second range will give you an idea of the way the phase shift network operates, and will demonstrate its limitations. 73, Phil 3NN.

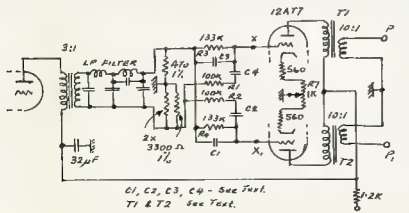
## TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R." in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted.

Please address all articles to the  
EDITOR "A.R."  
P.O. BOX 36,  
EAST MELBOURNE, C2,  
VICTORIA.



C1, C2, C3, C4 - See Text.

T1 & T2 - See Text.

Fig. 1a—Phase-shift network and post-phasing amplifier—transformer output.

# DX

VP4, OA4, BV, ZM7, 7GI, FP, AC5, MP4, ZC6, TY2

Sub-Editor: ALAN SHAWSMITH, VK4SS,

35 Whynot Street, West End, Brisbane, Qld.

ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB-EDITOR

Conditions are improving. All the bands are open with particularly good DX on 40, 30 and 15 mc. 35 Mc. has been showing signs of life in the direction of U.S.A. around 2300z.

The 1st circuits as yet are not good, but 14 Mc. via S.A. to Europe in the afternoons often has some good rare prefixes on it to chase.

Probably the most consistent paths as of now are to Europe on 40 mc from 1700z onwards. To Europe on 80 mc nightly 1200z. To U.S.A. on 15 mc daily from 2300z. South Americans are workable on 7 Mc around 1330z and on 14 Mc from 0300z. A short weak break through to South America on 31 Mc. sometimes occurs about 0300z.

Put on those phones. There's plenty to be heard.

## NOTES AND NEWS

**Indonesia (YR3):** It's a past event now, but if you are still wondering what the pile up was all about, Don Miller did get a permit and operated as W9WVW/AF3. If you managed a ten-second QSO, send the card to W4EC1.

**Georgia:** UFBUS is very active on a.s.b. 14.380 at 1800z might be good enough.

**Ascension Is.:** ZEDAR is expected to be on during Nov, and especially during "CQ" contest.

**Swan Is.:** K6AAB is reported active around 7010 Kc. Try about 0600z.

**Baleares Is.:** E4MBD on 14.030 at 2300z.

**Vallencia:** HV1CN very busy on 14.375 at 2100z.

**Thailand:** HSHH on 14.100 at 1230z.

**Cocos Keeling:** VK2G0 frequents 14.375 about 1200z.

**Marens:** KGGFV: Try scanning the dial around 14.375 by about 0200z.

**China:** Maybe you worked BY48K, if so QSL to Ask W4EC1. More operation from behind the bamboo curtain is expected by V960J very soon.

**Fernando De Noronha:** PY1ACQ is expected to open up from this rare one about the time this reaches your box, so keep an ear open for any pluses. No other info. available.

**Gough Island:** ZD5BC is awaiting s.b. equipment. Expect this mode of activity any time now.

**Alaska:** Z4AAB very active on 14.035, but reported as a pirate.

**British Guiana:** VP3MV 21.400 s.a.b. at 1700z. QSL to W9UOX.

**Neogelia:** 7T1AG said to be active on 14.035 around midnight our time.

**St. Pierre Is.:** FP9CA, 14.345 at 1700z.

**Caribbean Sea:** VP2KX St. Kitts, VP1AL Antigua, VP2SK St. Vincent, all using s.a.b. 14.

**U.S.S.R.-North Pole:** UP0L-13 on 14.030 about 0500z.

**Kashki:** UL7FA 14.131 and UL7FB 14.043 0140z.

**Portuguese Guinea:** CR3AD, 14.074 at 2300z.

**Malaysia Repabli:** SR3CB on 21.000 at 1800z.

**Eswatini:** 2K3CE, 14.255 at 1830z.

**Menaue:** WA6ZIQ reported delayed in his attempt to operate from 3A0.

**Jan Mayen:** This rare spot now has several operators both s.b. and c.w. Keep listening c.w. 20 when it goes to Europe is open.

**Bahrain:** MF4BC, 14.345, 1700z.

Much of the above info. by courtesy of LIDXA.

**Tahiti:** FO6BI is a regular on 21 and 28 c.w. mostly from 2200z.

**Korea:** Several HM's 1-3 are active on 15 mc daily from 2200z. HM1DE, HM1DB, HM1BV, HM1CR, HM1DF, HM1SBZ are some.

## DON'T FORGET

your VK/ZL Contest Log!

Deadline for local contestants is 15th December, 1965.

Deadline for overseas entrants is 15th January, 1966.

**Canadian Area:** Several U prefixes are usually workable each day from noon our time on 20 s.b. and c.w.

**Kuching:** 9M2FS is good for W7K, 14.080 at 1400z.

**Cuba:** CO2BB, 21.250 at 2300z. Mostly working U.S.A.

**S.S. Asia:** W9WVW, Don Miller, currently signing HS Thailand. Several more rare prefixes are to come. Just listen for the big pile-up on all bands and modes.

**Central America and India:** Ken VK3TL reports 48 mc to this area very good around 1300z. nightly. Some prefixes are CO2BB, VP2LF, VP4DS, VP5AR, HP1BR, etc.

## ACTIVITIES

Dud VK4MY (now settled on the Gold Coast from 14 c.w. URBST 1380, UAKB0 1350, KGA652 0130, OK1FP 1330, UW0KF 0748, SP5YA 1280, OAD03 0450, XE1ER 0445, UWB0Q 0658, UASDK 1314, ULKRF 1343, L1B0E 0230, VE2BB 0640, UCK10NE 1230, UCLAR 1300, also several others.

Ken VK3TL shows what good DX is available by the following report. He lists as worked on 30 mtr: BV4SK, CE1DP, CE1DE, CE2EW, CR3AK, GB3WAD, GD3RPF, HM3CG, HP1BR, IS1RU, JT1KAA, JT3AA, JT74, KGA4A, KGA52 (Saipei), ON5AZ/LX, OB80V, OD5BZ, OD5EE, OD5EG, PJ3CR, PJ3MI (Saint Maarten), VP2SK (St. Vincent), Z8AAL, ZW4AA, W9WVW/AF3. Worked on 40 mc: VP2LF, VP4DS (Trinidad), VP3 Grand Turk Is., YJ6WV. Best QSL's received: EP3RV, SV1AT, XN3MV, ZJ7FF, CE3AG, FP3TY, SJ3VE, OD5AL, HB3AF (Liechtenstein), 7X1AM, 9L1JR, BL1SL, 4XWQJ (QSO in 1962), 7Z3AB, VQZDT, 5W4KZ, EP3RO.

Z equals G.M.T.

My grateful thanks to 5WL Chas. Thorpe, L40L1, who regularly contributes information on Oceanic activities.

DX good listening, 73, Al, VK4SS.

## W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

### PHONE

Call	Cer.	C't-	Call	Cer.	C't-
	No.	ries		No.	ries
VK5MS	24	320	VK3JZ	61	240
VK5AB	45	312	VK2ADE	65	231
VK4RU	2	307	VK4HR	12	223
VK5MK	45	305	VK6KW	4	211
VK3AO	51	301	VK3WL	14	211
VK4FJ	21	283	VK3AAK	58	208

### Amendment:

VK3AGH 55 114

### C.W.

Call	Cer.	C't-	Call	Cer.	C't-
	No.	ries		No.	ries
VK3KB	10	331	VK3AGH	71	377
VK3QL	5	306	VK3EO	2	267
VK3CX	26	306	VK3RU	18	262
VK4FJ	28	300	VK3AHQ	79	260
VK3ADE	81	288	VK3AKK	66	253
VK3NC	19	286	VK3KH	73	247

### Amendment:

VK3YL	39	246	VK3RJ	42	231
VK6HR	8	246	VK3JZ	30	204

### OPEN

Call	Cer.	Cnt.	Call	Cer.	Cnt.
	No.	ries		No.	ries
VK3ADE	28	322	VK3ACK	6	300
VK6RU	5	312	VK3NC	77	267
VK3AGH	82	309	VK3JZ	61	271
VK4FJ	32	306	VK4HR	7	264
VK6MK	74	307	VK3VN	18	247
VK3AO	70	306	VK3TZ	23	242

## 31st A.R.R.L. DX CONTEST RESULTS

### AUSTRALIA

Final Score	Multiplier	Contacts	Hours	Operating Time
C.W. —				
VK3ZP	327,738	99	1261	80
VK3GW	245,678	86	1188	58
VK3EO	180,512	49	1208	48
VK2APK	185,285	35	1129	38
VK3JAK	185,213	30	088	28
VK3KX	18,033	83	367	85
VK3VN	20,750	45	228	9
VK3QK	29,580	34	280	4
VK3KX	5,390	13	146	4
Phone: —				
VK2APK	43,756	48	508	—
VK3JATN	41,385	47	895	19
VK4LT	11,824	38	154	—
VK3KX	1,481	8	90	—
VK3PN	343	6	19	—

### NEW ZEALAND

C.W. —				
ZL1AFW	29,830	44	814	23
ZL1AB	12,970	17	345	—
ZL1OY	3,523	14	84	—
ZL1QW	390	6	30	1
Phone: —				
ZL1AGO	29,833	48	406	—
ZL1ML	3,378	18	174	9



## CONTEST CALENDAR

8th/14th November:—	V.L.R.L. Anniversary Contest, phone.
6th/10th November:—	4th R.S.G.B. 7 Mc. DX Contest, c.w. section.
20th/21st November:—	2nd R.C.B. 13 Mc. Contest.
27th/28th November:—	"CQ" World Wide DX Contest, c.w. section.
15th December:—	ZL V.b.f. Field Day.
12th December/18th January:—	Ross A. Hull Memorial Trophy V.h.f. Contest.
15th/18th February:—	John Moly Memorial National Field Day Contest.

## A. R. R. L.

Associate Memberships (and renewals) are available by forwarding £2/14/- (plus 6d. interstate cheques) to:

Business Manager, W.I.A., 49 Cookson Street, Camberwell, E8, Victoria.

This includes the regular arrival of

"QST"

Sub-Editor: LEN POYNTER, VK3ZGP,  
14 Esther Court, Fawkner, N.15, Victoria

ADDRESS CORRESPONDENCE FOR THIS PAGE DIRECT TO THE SUB-EDITOR

As you will observe, the notes are rather brief this time as VK3 VYK and VK3 were the only parties interested enough in writing and unfortunately they did not arrive until late, which has restricted any survey being made. We hope that this will only be a temporary lapse and all will arrive promptly next month. Please time your notes to arrive by the 2nd of each month otherwise they cannot be considered.

What is your opinion of these notes? Are they serving a useful purpose in recording v.h.f. activity and opinions? With the difficulty in collecting news from the various Divisions would anyone miss this page if it were removed? Let's have your opinion—both from individuals and from the groups. If you think it is worth while let me know. The first five letters will be included for all those interested to read.

Don't forget to patronise the various field days now being organised for you. 73, ZGZF.

#### NEW SOUTH WALES

The Group meets regularly on the first Friday of the month. The November meeting will be on the 12th. The December meeting, which is the annual auction night, is on the 3rd, and the January meeting on the 7th will be a social night.

To the end of September there had not apparently been any worthwhile 8 metre openings.

The 8 metre "fox hunt" for October proved to be a win for the fox, 3ZTM, when the hounds could not find the "road" in the park. After the full event time had run they were called in.

The event for November will be on Wednesday, the 10th, with 3ZVJ as fox.

The December 8 metre event will be on the 22nd. A small Christmas party will follow the event. Keith 3ZVL will be the fox.

#### VICTORIA

It looks like the DX season has started with openings to VK4 on 8 late in the afternoon on the 10th. The December meeting to television on Channel 6 have been reported on a number of occasions during the past month.

Many new stations are appearing on the band, particularly on the net frequencies both a.m. and i.m. Activity is increasing at the low end of the band with a number of the old regulars appearing.

Two is seeing its share of activity now the weather is improving and regular openings

to Mt. Gambier and Deniliquin are keeping the locals happy.

The VK3 v.h.f. group has established a register of v.h.f. enthusiasts and welcomes all those interested and who are members of the W.I.A. to join. This may be done at a group meeting or by writing to VK3ZGP Len Poynter, 14 Esther Court, Fawkner, including name, address, call sign, telephone number and what bands you are active or interested in.

Field days in VK3 this season take place on Nov. 21 and Dec. 18. New Year week-end and during the N.P.D. in Feb. and March 18. See you there. 73, ZCZC.

#### SOUTH AUSTRALIA

Activity in VK3 is at last lifting itself from beneath the noise level and approaching the pre-Christmas activity level that is characteristic within the v.h.f. fraternity of VK3.

The outstanding v.h.f. event of the year and possibly for future years was the Amateur Television Display exhibited at the 1965 Royal Adelaide Show. The display, which was housed in the W.R.E. Pavilion, consisted of a television set receiving a programmed transmission from the QTH of George VK3ZEV. In order that entertainment value could be transmitted a special licence and frequency was allocated in the v.h.f. region. The majority of programmes televised emanated from the studios of George VK3ZEV. Entertainment value of excellent quality was provided at all times, and consisted of films, interviews, news and live broadcasts utilising the talents of local musicians of the modern variety.

Perhaps the highlight of the whole project was the successful conduction of two outside telecasts, one of a football match and the other of a model car racing circuit. From reports to hand the transmissions were of excellent quality, putting to shame the so-called professional quality dished out by the local T.V. stations.

The efforts applied to this exhibition by all concerned no doubt boosted the outlook of the community towards the radio amateur. Those primarily responsible for this outstanding achievement were George VK3ZEV and Maitland VK3AO with assistance from Ivan 3ZDJ, Rick 3ZGQ, Jim 3ZGV, Howard 3ZBE and Peter 3ZEE.

Two-metre activity received a boost when the P.M.G. decreed that Port Pirie was a television "fringe area" and that Radio Amateurs were not responsible for any interference experienced by viewers, providing that

reception of the local Channel 1 was not interfered with.

This would allow Jim ZMJ and John 3ZC to work into Adelaide, a path of 126 miles, on a more regular basis. No DX openings on 6 metres have been reported up till 30th September, although the reception of Channel 9 from Brisbane and Melbourne is regularly noted.

2-metre Screamable was held on Sunday, 28th September, with the eventual winners being Edwin 3ZFS and Brian 3ZBR. Considerable interest is being shown in Oscar IV although the re-transmission on 431.8 Mc. has caught the unprepared on the wrong foot. 73, Colin, VK3ZHI.

#### VKS

Doug 3KK is to be active on 6 and 8 this season and is working on a 2-metre final.

Currently interested in "Moonbounce" with c.w. as the preferred mode, Doug has a tower to go up as soon as he can "blend" it into the skyline so that it is not noticed.

#### ZL

On December 18 there will be a V.H.F. Field Day in ZL on all v.h.f. bands between 9 a.m. and 3 p.m. N.Z.T. (1150 G.M.T. 11/12/65 to 0300 G.M.T. 12/13/65). They will be on the lookout for VK contacts.

Bill 2L3CD reports steady v.h.f. activity.

#### ★

### 96 ELEMENTS—HAND-HELD



This photo was received by Jim Stewart (VK3ZFS) from Jim Geddes (VK3ZGG), who is at present in Massachusetts, U.S.A. This print was taken at the 73 Hamfest at Peterborough. It shows the prize-winning antenna in the antenna contest—96 elements on 432 Mc. You can imagine it was a problem because it had to be hand held, but they managed it OK. Jim first saw it amid and inverted on the top of a big old Chevy. It looked like an enormous bedstead and completely occupied the whole surface area of the top of the car.

It was one of the successful antennas used in the first July Australia Moonbounce effort. Signals from Arcibo were so strong that one of the chaps operating the club station thought he would try a dipole. He made the little dipole (he's in the left foreground of the snap) on a co-ax receptacle and plugged it into the feed line—lo, they could still hear Sam!

#### V.H.F./U.H.F. STATE RECORDS — SEPTEMBER 1965

<b>New South Wales:</b>			
30 Mcs.	VK3ADE to VETAQQ	8/4/59	1111 Miles
144 "	VK3ZMH to ZLAAAR	27/11/61	1410 "
432 "	VK1VF/1 to VK3ZPT	14/6/65	178 "
816 "	No claim		
1215 "	VK3ZAC to VK3ZCF/3	4/3/63	66.8 "
<b>Victoria:</b>			
30 Mcs.	VK3ALZ to XEPU	1/5/59	9413 Miles
144 "	VK3ZEA to VKARD	27/11/61	919 "
432 "	VK3AE to VKTLZ	15/1/66	283 "
816 "	VK3AKZ to VK3ANW	11/12/68	50.7 "
3200 "	VK3KA to VK3ANW	18/2/50	9.0 "
3200 "	VK3ZGT/3ZGK/3 to VK3ZDQ/3	14/12/63	63.5 "
<b>Queensland:</b>			
30 Mcs.	VK4ZAZ to KCGRG	16/3/58	5305 Miles
144 "	VK4ZAX to VKTZAO	27/12/61	1197 "
432 "	No claim		
	No other claims		
<b>South Australia:</b>			
30 Mcs.	VK3KL to WJACS/KHS	26/3/67	3261 Miles
144 "	VK3KJ to VK3KJ	8/2/65	120 "
432 "	VK3KAW to VK3ZEE	15/11/64	226.5 "
816 "	VK3ZTM/3ZGQ/3 to VK3ZIS/3ZTH/3	26/1/66	106.5 "
1215 "	VK3L4/3 to VK3ZCR/3	4/1/63	1.0 "
<b>Western Australia:</b>			
30 Mcs.	VK6GE to JASBP	30/10/58	5490 Miles
144 "	VK6ZCN to VK3ZHU	8/1/65	1330 "
432 "	VK6ZGZ to VK6ZGZ	30/6/65	59 "
576 "	VK6ZDS/3 to VK6LX/3	15/12/63	101.3 "
<b>Tasmania:</b>			
30 Mcs.	VKTLZ to JASL	3/12/58	5426 Miles
144 "	VKTLZAO to VK4ZAX	27/11/61	1197 "
432 "	VKTLZ to VK4ZAE	15/1/65	282 "
<b>Papua Territory:</b>			
30 Mcs.	VK3AU to KREDBY	30/4/59	6212 Miles
	No other claims		





## YOUTH RADIO CLUBS

Most "civilised" countries need vigorous de-bunking of the sloppy sentimentalists who think that money is the only way to get people means more generosity of giving without the proper challenge and training in responsibility. The Duke of Edinburgh's Award is a wonderful idea and a war medal of its success. Another excellent scheme is that organised yearly by the Science Teachers' Association to undertake independent research along lines of their own interests and encourage development of experimental techniques, (b) to encourage students to explain clearly and effectively both in writing and orally their purposes, methods and results. On their own merits, these Talent Search competitions have great success with a record entry in VKX of 200 projects of high standard, and 1963 will be higher.

When this success is reinforced by the support of a big commercial firm such as A.W.V. the results must be far-reaching. A.W.V. organised "Operation Flip-Flop" in conjunction with the Talent Search. No less than 15,000 transistors were awarded during the exhibition, with copies of the Flip-Flop circuit. Entries were to construct the unit, answer several questions, and write a 200 word purpose for it, and write 200 words on "The Place of Transistors in Electronics Today". Several questions were asked, and the winner, Roy Francis, of Springside High, produced an extremely well conceived, on matrix board and excellent 200 words. Copies of A.W.V. worth repeating: "Industrial sponsors, by offering such encouragement and assistance are helping to educate themselves to lead the scientists and engineers that are going to be needed so urgently by this country in the years of reconstruction ahead." On suggestion of a more effective way of distributing 15,000 transistors, but all honour to such industrial sponsors. Can such Division Council find some other way? Any other way? If anything happens to read this, I'll constructively ask some more questions. Have you supplied instructions to your schools? Have you contacted Education? Have you convinced the science lecturers at your schools? Colleges? The success of the year's Talent Search scheme, proved so effective in U.S.A. If case there are any rude remarks from PS, I do get an occasional answer!

The VKX is the only club the ways in which VKX has been making great strides forward. They now have 15 clubs, a pleasing number of industrial sponsors (public and company), and youth enthusiasts like Ted Matchett and Dave Buck to keep things going well. If they could only make a breakthrough at Teachers' College, they could overtake VKX now up to 48 clubs! I place great importance on convincing science teachers in training through their college that Y.R.S. will be of great benefit. Typical industrial sponsors in VKX are Transistor Kits Pty. Ltd. (donation of a kit to highest mark in Elementary Electronics), Radio Shack, and other sponsors are generous but prefer to be anonymous.

Nex 3YA should be looking after himself more, but he is very active as usual. He writes my four columns, and has attended Punched Boys' High Fela Day yesterday and was pleased to see the Radio Club at the top of the list. He is a very good operator, well, with a great line-up of boxed units labelled with the various Elementary construction projects. He is a very good writer and all our way Mr. Mudford is O.C. Club. Also went to D.C.A. Radio School Open Day—really good show indeed. Fine roll up of parents, friends, students and Y.R.S. leading a look-see. All very impressed. Attended Clemon Park Scout Hall last week—11 members of the club. Received the Scout Hall received Wirelessman's Badge, thanks to good work of Stan Burke RLK. These lads will now be going for the B.S. Licence. Am looking forward to taking part in January of the Air with Stan's a.s.b. transmitter operating from the Scout Hall.

At K.R. I am impressed in many places outside its own circle of the converted. I hope you noticed mention in the "A.R.S. News" of the B.S. scheme, very similar to ours. They are keen on trans-Atlantic co-operation and have offered a pennant for a VK competition. We have reciprocated. They are not keen to get involved much until 1962. There was also a write up of Y.R.S. in "Education News", the journal of the Y.R.S. Education Council, which is published at the higher level in Education circles. There

was a small article in "Popular Electronics" several months ago, and the P.M.G.'s own magazine has given us some publicity.

The only Postal Group I have news of is the one organised by local radio, Roger IRL. A competition (Essay on "Rescue from Electric Shock") was won by Peter Hardiman (16), of Warrumbidgee, who will receive a handy parcel with three transistors and other parts. Roger believes safety is very important in Y.R.S. training (again, Club Leaders please note!) I received a letter from a friend who

It is pretty sure there are things afoot in VKX, 5, 6 and 7, but I haven't anything definite. It would help if I had a reader there. (Not you, PS, please!) 72, Ken IKM.



## YOUTH RADIO SCHEME

### THE ELEMENTARY RADIO CERTIFICATE

To qualify for this award (issued by the Wireless Institute of Australia) a candidate must meet the following requirements and pass the examination suggested.

1. Must have been an associate member of the Wireless Institute or a financial member of an affiliated Radio Club or a registered member of the Wireless Institute of Australia, non-club participant in the Youth Radio Scheme for a period of at least one month.
2. Must produce a written statement or school report (in the case of a candidate who is still attending school) to show that he has gained passes in mathematics and science at the most recent school examination.
3. Must submit evidence to show that he or his parents hold a current Broadcast Listener's Licence.
4. Must demonstrate ability to make workmanlike soldered joints and connections and must answer oral questions about soldering materials as applied to Radio and Electrical construction.

5. Must identify eighteen out of twenty radio components displayed on a table.

6. Must complete to a high standard of workmanship and performance three of the following projects: (a) a crystal set; (b) a Morse code practice apparatus; (c) a radio receiver; (d) self-powered telephone; (e) a one-way telephone operating over a distance of 80 yards or between two rooms; (f) a continuity tester.
7. Must complete a written assignment relating to topics prescribed for the Elementary Radio Certificate or to topics in the school science course associated with electricity, magnetism or electronics, or to a topic in the high school electrotechnics course approved by the Manual Arts Master (applicable to N.S.W. candidates); (j) three laboratory experiments relating to electricity, magnetism or electronics; to the satisfaction of the Science Master; (k) such other project of equal or greater difficulty as may be approved by the Club Leader.
8. Must submit a neatly compiled Radio Notebook containing all the information required in the study of the topics specified for this Certificate.
9. Must gain at least 70 per cent. of the possible marks in a written examination based on the above.

(a) An Introduction to the Youth Radio Scheme. The Wireless Institute of Australia, a national organisation, and the Australian Licencing, the Youth Radio Scheme, the Radio Proficiency Certificates, conditions for the Elementary Radio Certificate.

(b) Elementary Electricity. Simple notions of what electricity is, electron flow, simple wet cells, polarisation, the dry cell, connections in series, parallel and series-parallel, simple pressure, voltage as a unit of electrical pressure, use of voltmeter, conductors, insulators and resistances, the resistor colour code, simple methods to recognise of values colour bands, tolerances.

(c) Elementary Magnetism. Bar and horseshoe magnets, magnetic field, lines of force, experiments with iron filings, attraction and repulsion, electro-magnets, permanent and temporary magnets, how to make a magnet, how to demagnetise a magnet to lose its magnetic properties? Use of magnets in radio components.

(d) Circuit Symbols. The shorthand of radio, British and American symbols for the following components: aerial, earth, fixed and variable capacitors, coil, germanium diode, headphones, variable capacitor, variable inductor, fixed and variable resistances, microphone transformer.

(e) How to Make a Crystal Set. Simple notions of radio waves, of band of frequencies to select desired signal currents, changing fre-

quency of reception, broadcast band limits, simple notions of modulation and detection, how magnetic headphones operate, differences between audio and radio frequency currents, notions of selective-tuning considerations in making a crystal set, workmanship hints, aerials for crystal sets, various crystal set circuits, a match-box crystal set.

(f) How to Make a Morse Set. Practical Set. Constructional details and operating principles of a simple buzzer, an electric bell, the Morse key.

(g) How to Make a One-Way Telephone. Constructional details and operating principles of a carbon microphone circuit limitations of one-way operation, use of calling bell or buzzer.

(h) How to Make a Continuity Tester. Purposes of a continuity tester, various types of indicator—lamp, lamp, meter, headphones, circuits, constructional details and operation, practical use in locating circuit and component faults.

**Advertisement of Radio in Australia.** The Postmaster-General's Department, Radio Branch, licensing of radio and television receivers, and selection of radio and television services, penalties for unlicensed operation, Amateur club sign prefixes in Australian States and New Zealand, broadcast frequencies of radio and television.

**Note:** The written examination must not be attempted until all other tests and requirements have been completed.

The Elementary Radio Certificate at pass level will be awarded to candidates who gain from 70 to 79 per cent; at credit level to those who gain from 80 to 89; honours level to those who gain from 90 to 100 per cent.

—R. C. Black, VK3YA,  
Federal Co-Ord. Y.R.S.

## PYE REPORTERS

(Continued from Page 8)

crystal oscillator coil. The maximum reading is what we want. Pos. 2 on N5A.

Tune C75 on the multiplier drive. If you have an English version you will probably have two air condensers, butterfly type. The one closest to the tx oscillator is adjusted first, then the next. Also maximum here. Pos. 4 on N5A.

Now go to the p.a. trimmer C71 and tune for dip. This should cause the lamp in dummy load to light.

If it does not, check coupling coil L12. If too tightly coupled it will reduce the r.f. output, also if too loosely coupled. By adjustment, you should light the globe even with 1 watt r.f.

Go back and check tuning once again and when all is peaked, the globe should light at least half brilliance.

## NEUTRALISATION CHECKS

Remove crystal and tune p.a. condenser tuning through resonance. An r.f. voltmeter would be quite handy here. If dummy load or r.f. meter either lights or gives a reading, tune p.a. neutralising condensers (6 pF.).

## MODULATION CHECKS

Whistle into mike, globe should light more brightly. A multimeter, on a.c. range one side to check and the other on the h.t. point to the r.f. at p.a. should give a reading of 120-150 volts.

If you get no modulation, check top contacts of relay, looking from the underside of chassis, for faulty contact.

If modulation seems low, while whistling into mike, adjust mult. plate condenser, modulation should show a change here. Normally, this can increase the modulation quite a lot. Failing this, check output valve 6AQ5 (V8), also valves in tx.

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

## Amateur Radio, November, 1965



# FOSTER DYNAMIC MICROPHONES

## SPECIFICATIONS:

Output Impedance ... 50 ohms or 50K ohms  
Effective output level ... -55 db. [0 db. — (one) 1V. Microbar]  
Frequency response ... 50 to 15,000 c.p.s.

## OMNI-DIRECTIONAL DYNAMIC:

Plastic Diaphragm. Swivel fits 5/8" 26 t.p.i. Stands.  
Size: 4½" long, 1½" diameter. Colour: TWO-TONE GREY.  
Cable: 12 ft. of P.V.C.

Retail Price 50 ohms: £4/7/9 + Sales Tax 10/11

Retail Price 50K ohms: £4/10/0 + Sales Tax 11/3

A QUALITY PRODUCT FOR TAPE RECORDERS & P.A. USERS



DF-3



Marketed by **ZEPHYR PRODUCTS PTY. LTD.**  
58 HIGH STREET, GLEN IRIS, S.E.6, VICTORIA

Phones: 25-1300, 25-4556

Manufacturers of Radio and Electrical Equipment and Components

Agents: D. K. Northover & Co; Neil Muller Ltd.; Homecrafts (Tas.) P/L; Jacoby, Mitchell & Co. P/L; T. H. Martin P/L.

NOW AVAILABLE—

NEW 1965 EDITION

## ★ A.R.R.L.—Radio Amateur's Handbook

*The Standard Manual of Amateur Radio Communication*

Price 58/6 and 2/6 Postage

## ★ The Radio Transistor Handbook

by Stoner & Earnshaw

Price 64/9 and Postage 1/9

THIS UP-TO-DATE HANDBOOK COVERS A WIDE RANGE OF COMMUNICATION  
FOR BOTH AMATEUR RADIO & COMMERCIAL APPLICATIONS

## MCGILL'S AUTHORISED NEWSAGENCY

Established 1860

183-185 ELIZABETH STREET, MELBOURNE, C.1, VIC.

"The G.P.O. is opposite"

Phones: 60-1475-6-7





# HAMADS

Minimum 5/-, for thirty words.

Extra words, 2d. each.

Advertisements under this heading will be accepted only from Amateurs and S.W.s. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. Box 36, East Melbourne, C3, by 5th of the month and remittance should accompany the advertisement.

**ANY** offers for B.C. Car Radio advertised in last month's ad.7 Also for sale, Stromberg Carlson 3-speed gramophone, turntable and pick-up, £3. A. W. Chandler (VK3LC), 1536 High St, Glen Iris, Vic. Phone 50-2556.

**COLINS** S Line, 75S1 and 32S1, with power supply, mike, speaker. Complete top quality s.s.b. Ham Station, for urgent sale. VK3BRW. Phone 44-7701.

**FOR SALE:** Complete 50 w. a.m. Station, consisting of A.W.A. AMR101 RX with all coil boxes, Gelson V.F.O. to 60K5 TX on all bands 80-10 metres, modulator, microphone and all power supplies and relays. A completely integrated and portable rig with p.t.t. facilities. £75 or near offer for the station. Do not wish to separate. H. L. Hepburn, VK3AFQ, 4 Elizabeth St, East Brighton, Vic. Tel. 96-2144 evenings.

**FOR SALE:** Eddystone 640 Receiver, 5-band Transmitter (Gelson V.F.O. 6146 p.a.), Power Supply, Modulator, Microphone, Class C Wavemeter, Grid Dip Oscillator, Pye Reporter, 522, 3 c.r. tubes, Antenna Tuner plus s.w.r. meter, Q8er, Q9er, S meter, etc. You collect, £110. Crated for dispatch, £125. VK2YN, Picton. Tel. after hrs, 91312.

**SELL:** C.W. tx 30w., 815 in parallel, pi-coupled to antenna, driven by Gelson multi-band v.f.o., two meters and key jack, p.s. included, all in black crackle cabinet, £15. J. Kitchen, 52 Railway Pde, Midland, W.A.

**WANTED:** General Coverage Receiver in first-class order for non-technical S.W.L. Also sell TBY Transceiver, as new, with phones and mike (28-80 Mcs.), £10. Phone 232-7480 (VK3ZKA) between 6-8 p.m.

**WANTED:** One kind person to lend a communications receiver to a very careful blind boy during Christmas holidays. Contact VK2AXX, St. Edmund's School for Blind Boys, Wahroonga, N.S.W. Phone 48-1684.

**WANTED:** To Buy: 6 mx or 2 mx Mobile Rig, complete and working. Offers to Box 206, P.O., Liverpool, N.S.W.

**WANTED:** 5-band s.s.b. Transceiver with power supply. State make, price and condition to VK6WG, Lot 822, Heytesbury St, Derby, W.A.

s.s.b. in the paragraphs. This must cease forthwith, as instead of being anti, it looks more like a radio pro, and even might be at the cross roads and about to desert a.m. Therefore, as from now I intend to refer when I unfortunately have to refer to s.s.b. to label it as "the thing," and in this way I will be able to keep the notes going without this horrible repetition of why did they ever have to bring "the thing" into an otherwise quiet hobby? 73 de SPS-Pansy to you.

## WESTERN AUSTRALIA

We heard mobile Stan VK3ZE operating from Baledonia and heading in the direction of Vio, and about the same time, a companion, Mac, of whom I understand is ex of Mendies. Hope you enjoyed your tour of VK8 chaps. The liquid refreshments of Kalbar, or didn't you try it Stan? If you got tangled up with EDD and SEP any old thing could happen.

Note a new call sign, VK6SW, congratulations Bill on the nice a.m. transmission and welcome to the 80 mx band, which is becoming very active edge of the year.

Len 6LG has been on the sick list up till 11th September. Sorry to hear this Len, we all hope you are O.K. now.

We have been hearing the voice of Alan GAB from various shacks.

George 8CH is heading in the northern direction, both himself and XYL intend to enjoy the picturesque scenery and beautiful array of wild flowers that is to be found in the north at this time of the year, particularly in the Murchison area. I guess the camera and tele lens will be working overtime. Hope you strike good weather, too.

Have ideas that we may hear a station in operation some time soon from Leonora. "Hurry up and get that ticket Brian." At the September meeting of the Institute a rather interesting talk was heard from Cedric ECD, the topic being on solid state transceivers. One in the north-west 2-4. Not sure the wooden spoons were used as a few in particular discussed the future of some tx equipment available.

Most enjoyable evening was had by all. 73, 8KN.

## TASMANIA

Short and sweet this month, I'm afraid, folks, though I expect you are glad, and have not got a moon either!

The October General Meeting was attended by 30 members and some half dozen visitors, including one, Ken 3AF, that well-known Melbourne ham. Ken was the one who broke into the clubrooms during the lecture and was not recognized until supper time, when Ted 72J muttered some protestant there about it. "It's the VK3 President!" Trust you enjoyed your all-to-short stay in the Apple Isle, Ken, and hope we see you over there again in the not too distant future.

The lecture at the above-mentioned meeting was the second one given by Mr. Rod Sutherland, of the National Radio Foundation, etc. I hope we may have a third lecture some time

soon. I feel sorry for those members who missed it, both lectures have been most interesting and enlightening, and delivered so that the layman can understand the medical side of the situation. I think Len TLE deserves a high post for the best of the way he comes up every month with a most informative lecture on some subject allied to radio.

Another pair of visitors were Kevin 5NN (the VK5 Federal Councillor) and Phil 3ARD, who were here in connection with the generation of power (50 cycles) so I am told.

Our weather has been very much better than the Amateur's standpoint, winds in the 80 m.p.h. bracket and one gust of 90 m.p.h. recorded. Several local ham bands are now among asterisks down were those of TTX, TED, TTA, TZMD, and yours truly.

There are a nice 2 calls to be heard locally (at present), they are Barry T2BJ and David TZMD, who were both successful in the July exams. Both leads are on 53 Mcs. at present, but will not be long before other bands are "under their belts."

VK7VI now sports 50 watts on 6 metres, and xtal locked receiver, to a ground plane on the roof, and we hope soon to have a 322 set on 3 metres.

This year's Hamfest, to be held at Campbell Town on November 27 and 28, is a full State job, with the three zones all doing their share. The final success will depend of course on the local bands, but I am sure they will turn up with the family and the mobile rig. See you there. 73, Geoff TZAB.

## NORTH-WESTERN ZONE

The last social meeting of this zone was another very successful one with a large attendance in the hall. The evening was most enjoyable. The meeting was devoted entirely to lectures and the first person to take the floor was Brian 8CE.

A blackboard was produced together with an ample supply of chalk, and when everything was organized Brian carried on with what was to be a very interesting talk on acceptor and rejector circuits.

After Brian had stepped down, Gerald Wade, a young amateur, who had been on the list a long time, gave a talk on a 3-metre converter suitable for mobile operation. Gerald then brought along his own transmitter, which he had built himself and which was beautifully constructed. With the aid of a circuit diagram Gerald showed the meeting the various stages of operation.

The last lecture of the evening was given by none other than that genius of electronics and radio, the late Mr. J. George. George's subject was mobile antenna design and once again we were all entertained to a most interesting and instructive talk on one of George's pet subjects, complete with the actual working model of his 80-metre mobile whip together with his associated loading coils and matching circuit.

After the lectures, supper was served in a 72RS/MS style. Among the crowd it seems to be increasing every meeting! I noticed a new face—do you, a visitor from Burnie, Jack Hillman. Welcome Jack and make yourself at home with the gang.

It was during supper that I first noticed a rather learned looking gentleman, who turned out to be the master of the evening, Mr. J. George, busily engaged in positioning a notice board in full view of all and sundry. Now this zone never having been privileged with owning its own notice board—it caused a bit of trouble for everyone pushed forward to have a tape—but soon receded rather quickly when they discovered the typewriter and the notice board together with a black list pinned on it. However, the message got home and a few paid the dues and had no difficulty in securing their names struck off the black list. I asked Mack why his name was still on the list and he replied, "I think that you have something to write about!"

The evening concluded with a rather complicated piece of radio equipment being brought forward by the master of the evening, Sid 78F. Now Sid being a bachelor, loves to fiddle with things and this is his latest dreamchild. He said that he had never had even been inside Sid's shack, but if you have not the best way of describing it would be to say it is a masterpiece of engineering. Hawthorn Radio mail order establishment.

There must be just about every piece of expensively equipment procurable stacked in that small room all waiting for Sid to lay his hands on to tinker with when his mood so decides.

Don't forget the Hamfest at Campbell Town this month—bring along your family and your mobile outfit in the front seat even if it means having to shove your mother-in-law in the back, and make a day of it.

I will be there complete with powerful field glasses and various disguises to catch more gossip for the December newsletter, so until then good DX and pleasant rag chewing. 73, David 8MS.

**Repairs to Receivers, Transmitters; constructing and testing; xtal conv., any frequency; Q5-ers, R9-ers, and transistorised equipment.**

## ECCELESTON ELECTRONICS

146a Cotham Rd., Kew, Vic. Ph. 80-3777

**Stockists of Radio and Electronic Components for the Amateur Constructor and Hobbyist**

First Ring, Write or Call on

**WILLIAM WILLIS & Co. Pty. Ltd.**

428 Elizabeth St., Melbourne. Ph. 54-6539

## "ELECTRONICS ASSOCIATES"

is now

## AUSTRALIAN ELECTRONICS

Same guarantees, same low prices.

76 VIEW STREET, HOBART, TAS.

# A LARGE RANGE OF TRANSMITTERS, RECEIVERS, TEST GEAR, AND DISPOSALS RADIO PARTS AVAILABLE

## SCR522 TRANSCEIVERS

Freq. range 100-156 Mcs.  
Xtal locked. Complete with valves less xtals.  
Brand New Condition. £13 plus freight.

## METERS, P25 TYPE

0-500 uA, 52/6; 0-100 uA, £3/9/6; 0-1 mA., 45/-;  
0-10 mA., 45/-; 0-50 mA., 45/-. Full range of  
Meters and Multi Testers available.

## PHILIPS TA101C SIGNAL GENERATOR

100 Kcs-23 Mcs., attenuation to less than 1 micro-  
volt, 400 c/s. mod., 6v. d.c. and 230v. a.c., £25.

## TRI935 V.H.F. TRANSCEIVERS

Range 115-156 Mcs., a.m. mod., £15. Weight 25 lb.

## ARCI V.H.F. TX/RX

832A Fnal, 100-150 Mcs., £15.

## MN26C COMPASS RECEIVER

150-1500 Kcs., complete w. tubes, as new condi-  
tion, £14.

## CO-AXIAL CABLE

UR70, 72 ohms, 3/16 diam., in 27-yd. Rolls, £1,  
plus 7/6 pack. and post.

## C.R.O. TUBES

CV407, 10/- each; CV392, 10/- each.

## TT15 TWIN TETRODES

10/- each, w. Ceramic Socket.

## TRANSISTORS

Brand New, OC72, OC44, 2N132, OC66, OC45, 8/-  
each. AT1138 Power Transistor, 30w. Class B, 30/-  
Also Diodes: OA70, OA81, OA85, OA95, 3/6 each.

## MASTER INST. 0-50 uA METERS

2 1/2" square, scaled 0-100%. Only £2 each.

## COLLINS MODULATION TRANSFORMERS

20 watt, 6000 ohms P-P, 6000 ohms Sec. Limited  
quantity, 35/-.

## SIGNAL GENERATORS

LSG 10 Signal Generator, 120 Kc.-260 Mcs., £13.  
LSG 11 Signal Generator, 120-Kc.-390 Mcs., pro-  
vision for xtal, £15.

## WANTED TO BUY

Communication Receivers, Test Equipment,  
etc. Call, write or phone. Equipment in-  
spected and picked up at your convenience  
any night or week-end.

## COMMAND TRANSMITTERS

6-9 Mcs. Complete with valves. Excellent  
condition. £9/10/-.

## COMMAND RECEIVERS

6-9 Mcs. Complete with valves. Excellent  
condition. £10.

## BAGS OF 100 ASSORTED RESISTORS

Mainly IRC. 1/2 watt. £1.

## BAGS OF 80 ASSORTED CAPACITORS

Miniature. All 500 vw. £1.

## BENDIX LM7 FREQUENCY METER

A.c. Power Supply. Original crystal and calibra-  
tion book. With modulation. Spare set valves.

**MINIATURE CAPACITORS**, 350v d.c.w., .001,  
.02, .005, .0005, .0001, .0002, 6d. each.

## POWER SUPPLIES

400v. 200 mA. 6.3 v. 5v.; 350 v. 200 mA. 6.3v. 5v.;  
or 270v. 150 mA. 6.3v. 5v.; 5V4 rectifier. Only £3  
each.

## INDICATOR UNITS

3 JP1 PDA C.R.O. Tubes, 2 x OB2, 4 x 6AK6,  
1 x 6AL5; Front Panel Controls: Horizontal Gain,  
Vertical Centre, Focus, Horizontal Centre, In-  
tensity. Internal Modulation, supplied in packing  
case, £12 each.

## CRYSTALS

Selected Frequencies, 10/- each. Sorry, no mail  
orders. Personal shoppers only.

## RELAYS

GPO 3000 Type, 500 ohms plus 500 ohms, D.P.D.T.,  
7/6 each or 3 for £1.

**SELSYN MOTORS**, £2/10/- each.

## DARTRONIC MODEL 381 OSCILLOSCOPES

3AFP31 flat face tube. Vertical Amplifier: Sensitivity  
100 mV./Cm. Bandwidth d.c.—9 Mcs. Continuously  
variable frequency compensated. Input attenuator, d.c.  
coupled vertical amplifiers, calibration voltage 10 v.  
Peak to Peak. £69/10/-.

## ANY QUERIES

Beginners are welcome, ask Jim and Laurie Gar-  
diner any questions. They are Amateur Radio  
operators and will be only too pleased to assist.

## SPECIAL

6AC7. Eight for £1.

ALL ITEMS FREIGHT EXTRA

# UNITED TRADE SALES PTY. LTD.

280 LONSDALE ST., MELBOURNE, VIC. (Opp. Myers)

Phone 32-3815



# WARBURTON FRANKI

## MICROPHONE MIXERS

### TRANSISTORISED

Mixes the outputs of up to 4 high impedance microphones. Separate volume controls for each mike.

Attractive metal cabinet 6" x 2 3/4" x 2 3/4".

**72/-**

Plus S.T. 12 1/2%.

## POLYPACS

Bags of Assorted Components.

**10/- each**

S.T. Inc.

No. 1—30 Resistors, 1/2 and 1 watt—also Presets.

No. 2—20 Capacitors—Paper, Mica, Plastic, Ceramic.

No. 3—20 Silver Mica Capacitors.

No. 4—20 Styrofoam Plastic Capacitors.

No. 5—50 Assorted Grommets (2 for 10/-).

## CAPACITOR SUBSTITUTION BOXES

Nine values from 100 pF. to 0.22 µF. Selected by rotary switch. Complete with leads and clips.

**24/8**

plus 12 1/2% S.T.

## RESISTOR SUBSTITUTION BOXES

Twenty-four values from 15 ohms to 10 megohms. Selected by two rotary switches. Complete with leads and clips.

**36/6**

plus 12 1/2% S.T.

Pack and Post, either of above 1/-.

## SIGNAL GENERATORS

### FAMOUS LEADER LSG-11

**£15 (\$30)** incl. Tax and Freight.

THE LEADER LSG-11 is a general purpose signal generator having features which make it most useful in testing, checking and experimenting with radio and audio frequency circuits. Calibration accuracy is  $\pm 1\%$  below 30 Mc. and  $\pm 3\%$  to 390 Mc. This feature permits easy alignment and checking of tuned circuits, i.e. amplifiers, etc.

Wide frequency range: 120 Kc. to 390 Mc., stable Colpitts oscillator with buffer stage. Two audio modulation frequencies. Provision for quartz crystal. Clear scales for frequency calibration. Compact and rugged construction. Attractive heavy steel cabinet.

#### Specifications:

Freq. range: 120 Kc.-120 Mc. on fundamentals. Calibrated harmonics: 120-390 Mc.

R.F. output: 0-100,000 µV., adjustable (120 Kc.-30 Mc.).

Modulation freq.: 400 and 1,000 c.p.s., a.f. output adjustable.

Crystal oscillator: 1 Mc. to 15 Mc.

Tube complement: one 12BH7, one 6AR5. Accessory: one 15 ohm cable.

Power supply: a.c. 50/60 c.p.s.; 100v., 110v. or 220v. as specified; 13VA. approx.

Size: 27.5 x 19 x 11.5 cm. (10 3/4 x 7 1/2 x 4 1/2 in.). Weight: 2.75 kg. (6.1 lb.).

## TRANSFORMER RECTIFIER SETS

A. & R. Transformer and Matching Contact Cooled Rectifier.

Output: 250v. d.c. at 60 mA. Much cheaper than ordinary transformers using valve rectifiers, or silicon diodes. Suitable for instruments, radios, amplifiers, etc.

**36/- set**

Plus S.T. 12 1/2%.

### ALSO

Low Voltage Sets — Transformer and Rectifier to give output of 12-15 volts at 2 amps. Suitable for model trains, transistor radio power supplies, etc.

**41/- set**

Plus S.T. 12 1/2%.

## TRANSCEIVERS

### TOKAI MODEL TC-911

- 9 Transistors, with crystal control circuit.
- Compact and light weight.
- One-hand operation.
- Separate built-in Speaker and Microphone for telephone-like operation.
- Economical—uses 7 pen light batteries (supplied).
- 5 ft. telescopic whip antenna.
- Earpiece and carrying case also supplied.
- Frequency—27.24 Mc. (11 metre).
- Output—130 m.w. (non-distorted).
- Size 7" x 3" x 2".
- Weight—1 1/2 lb.

**£33-15-0**

Plus S.T. 12 1/2%. Set of two.

## SILICON DIODES

18 amps. at 50 p.i.v. Available with either K or A to case.

**7/6** plus S.T. 12 1/2%.

1 amp. at 1,000 p.i.v.

**13/6** plus S.T. 12 1/2%.

Pack and Post 6d. each.

## PROTECT YOUR PREMISES WITH THE

### SCOTT ELECTRONIC EYE

- A.C. Mains Operated.
- Kit consists of Light Source and Eye Unit.
- Complete with power supply, amplifier, buzzer, hardware and connecting wires.

Use across doorways or other openings up to 25 ft. wide.

**£16-13-4**

Plus S.T. 12 1/2%, plus postage for weight of 4 lb.



# WARBURTON FRANKI

**220 PARK ST. SOUTH MELB., VIC.** PHONE 30 lines **69-0151**



TRADE  
ALSO  
SUPPLIED

● Please include postage and freight with all orders